

AD-787 300

PERSONNEL ARMOR

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DDC-TAS-74-31

PERSONNEL ARMOR

A DDC BIBLIOGRAPHY

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Military Personnel	Buoyancy	Human Factors
Flight Crews	Metallic Textiles	Engineering
Army Personnel	Nylon	
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<p>This bibliography contains citations of 54 unclassified reports dealing with body armor of military personnel. Included are reports describing test methods and techniques for evaluating the technical performance and characteristics of body armor.</p> <p>Corporate Author-Monitoring Agency, Subject, Title, Personal Author, Contract, and Report Number Indexes are included.</p>		

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F O R E W O R D

This bibliography, entitled *Personnel Armor*, contains 54 unclassified references. Bibliographic citations have been selected from documents processed into the Defense Documentation Center's data bank between January 1953 and May 1974.

The bibliography is arranged in ascending AD-number sequence.

Corporate Author-Monitoring Agency, Subject, Title, Personal Author, Contract, and Report Number Indexes are included.

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Administrator
Defense Documentation Center

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REPORT NUMBER.....	R-1

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AD- 21 004

QUARTERMASTER RESEARCH AND ENGINEERING COMMAND NATICK
MASS

ENERGY COST OF WEARING ARMORED VESTS AND CARRYING
PACK LOADS ON TREADMILL, LEVEL COURSE, AND MOUNTAIN
SLOPES (U)

MAY 53 JIP WINSMANN, FRED R.; VANDERBIE, JAN H.;
DANIELS, FARRINGTON JR.;
REPT. NO. EPB-208

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. NO. 2 ON PHYSIOLOGY OF LOAD-
CARRYING.

DESCRIPTORS: (*FATIGUE(PHYSIOLOGY), MEASUREMENT), (*BODY
ARMOR, FATIGUE(PHYSIOLOGY)), MUSCULOSKELETAL SYSTEM,
LOADS(FORCES), WEIGHT, MILITARY PERSONNEL, MOTION,
TERRAIN, MOUNTAINS, ENERGY, CONTAINERS, FASTENINGS,
METABOLISM, NYLON, LAMINATES (U)
IDENTIFIERS: TREADMILLS, WALKING (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 29 020

WATERTOWN ARSENAL LABS MASS

BALLISTIC EVALUATION OF ARMORED VESTS EMPLOYING
NYLON, DORON, AND MANGANESE STEEL AS ARMOR VEST,
ARMOR, T52-1 VEST, ARMORED, M1951 SPOONER VEST (U)

JAN 54 11P MASCIANICA, F.S.:
REPT. NO. WAL-710/1014
PROJ: ORD-TB4-10

UNCLASSIFIED REPORT

DESCRIPTORS: *BODY ARMOR, BALLISTICS, EFFECTIVENESS, (M)
MATERIALS (M)
IDENTIFIERS: M-10 MOTORS (M)

UNCLASSIFIED

JDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 29 480 6/21

CHEMICAL CORPS MEDICAL LABS ARMY CHEMICAL CENTER MD

WOUND BALLISTICS, WOUNDED IN ACTION, KOREA, 6 AUGUST
1953-19 AUGUST 1953 (U)

MAR 54 1V COE, GEORGE B.
REPT. NO. RR257

UNCLASSIFIED REPORT

DESCRIPTORS: (•BALLISTICS, SOUTH KOREA), TACTICAL
WARFARE, NORTH KOREA, WOUNDS AND INJURIES, BATTLES,
WOUNDS AND INJURIES, CASUALTIES, SURGERY, (U)SURGERY (M)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 35 448

MARINE CORPS LANDING FORCE DEVELOPMENT CENTER QUANTICO
VA

ARMORED VEST, MODIFIED, EX 53-1, STUDY, EVALUATION
AND FIELD TEST OF (U)

FEB 54 IV
REPT. NO. T 1041 1

UNCLASSIFIED REPORT

DESCRIPTORS: *BODY ARMOR, EFFECTIVENESS, PROTECTIVE
CLOTHING (M)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 37 068 1974
MARINE CORPS LANDING FORCE DEVELOPMENT CENTER QUANTICO
VA

BODY ARMOR

(U)

JUL 54 1V
REPT. NO. T 1041

UNCLASSIFIED REPORT

DESCRIPTORS: (*BODY ARMOR, TEST METHODS), TERMINAL
BALLISTICS, PENETRATION, ARMOR PLATE, ACCEPTABILITY,
MATERIALS, DESIGN (M)

UNCLASSIFIED

DUC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 39 470

CHEMICAL CORPS MEDICAL LABS ARMY CHEMICAL CENTER MD

A COMPARATIVE BALLISTIC STUDY OF THE STANDARD U.S.
ARMY VEST. M1952-A, AND OF THE CANADIAN ARMOR VEST,
X53

(U)

JUL 54 IV MAHEUX, R.C.; STEWART, GEORGE M.;
REPT. NO. RR300

UNCLASSIFIED REPORT

DESCRIPTORS: •BODY ARMOR, EFFECTIVENESS
IDENTIFIERS: M-1952 ARMORED VESTS

(M)

(M)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 52 243

AEROJET-GENERAL CORP AZUSA CALIF

DEVELOPMENT OF PLASTIC MATERIAL FOR PERSONNEL
ARMOR

(U)

NOV 54 IV YOUNG, D.A.;
CONTRACT: DAI28 017ORDP1472

UNCLASSIFIED REPORT

DESCRIPTORS: *BODY ARMOR, PLASTICS

(M)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 69 734

AEROJET-GENERAL CORP AZUSA CALIF

DEVELOPMENT OF PLASTIC MATERIAL FOR PERSONNEL
ARMOR

(U)

FEB 55 IV YOUNG, D.A.;
CONTRACT: DAI28 0170RDP1472

UNCLASSIFIED REPORT

DESCRIPTORS: •BODY ARMOR, •PLASTICS, DESIGN, MATERIAL(M)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-255 237

QUARTERMASTER CORPS WASHINGTON D C

A SET OF ANGLES OF OBLIQUITY FOR USE IN ASSESSING
BODY ARMOR

(U)

FEB 61 IV
DECARLO, GERALD:

MAISEL, HERBERT; CHANDLER, WALLACE;

UNCLASSIFIED REPORT

DESCRIPTORS: *BODY ARMOR, DISTRIBUTION, EFFECTIVENESS,
PENETRATION

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-258 296

NAVAL MEDICAL FIELD RESEARCH LAB CAMP LEJEUNE N C

THE EFFECT OF SIMULATED TROPICAL CLIMATE ON THE
PERFORMANCE OF MARINE CORPS PERSONNEL WEARING AN
INTEGRATED BODY ARMOR-LOAD CARRYING SYSTEM (BALCS) (U)

MAY 61 IV MARTORANO, J.J.; COOK, E.B.; BLYTH, C.S.;

UNCLASSIFIED REPORT

DESCRIPTORS: *BODY ARMOR, *NAVAL PERSONNEL, *STRESS
(PHYSIOLOGY), CLIMATE, LOADING, MARINE CORPS, MILITARY
PERSONNEL, PROTECTIVE CLOTHING, TESTS (U)

AN ATTEMPT WAS MADE TO DETERMINE TO WHAT EXTENT THE
WEARING OF A BODY ARMOR-LOAD CARRYING SYSTEM
(BALCS) AND THE CARRYING F : TOTAL LOAD OF 54
POUNDS WOULD AFFECT THE ABILITY OF A GROUP OF U. S.
MARINES TO DO A FIXED AMOUNT OF WORK UNDER SIMULATED
TROPICAL CLIMATIC CONDITIONS. ALTHOUGH THE ADDITION
OF THE INTEGRATED BODY ARMOR-LOAD CARRYING SYSTEM
(BALCS) PRODUCED SIGNIFICANT INCREASES IN THE
SEVERAL PHYSIOLOGICAL PARAMETERS MEASURED, INCREASES
WERE WITHIN NORMAL PHYSIOLOGICAL LIMITS FOR THE 45-
MIN PERIOD IN WHICH THE SUBJECTS WERE EXPOSED TO THE
EXPERIMENTAL CONDITIONS. ASSESSMENT OF THE ADRENAL
CORTICAL ACTIVITY, AS INDICATED BY THE MEASUREMENTS
UTILIZED IN THIS STUDY, SUGGESTED THAT NEITHER THE
HEAT AND HUMIDITY IN WHICH THE SUBJECTS EXERCISED NOR
THE WEARING OF THE BALCS WAS OF A SUFFICIENT
MAGNITUDE TO CAUSE MEASURABLE STRESS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-259 057

MELLON INST PITTSBURGH PA

BALLISTIC PROTECTIVE BUOYANT MATERIALS

(U)

MAY 61 1V JASKOWSKI, M.C.;
CONTRACT: N140 138 68879

UNCLASSIFIED REPORT

DESCRIPTORS: *ARMOR, *BODY ARMOR, *DACRON, *FIBERS
(SYNTHETIC), *ORLON, ANTIPERSONNEL AMMUNITION,
BALLISTICS, COATINGS, EFFECTIVENESS, FIBERS,
FRAGMENTATION AMMUNITION, GLASS TEXTILES, LAMINATES,
METALLIC TEXTILES, MOISTUREPROOFING, PENETRATION,
PLASTICS, PROJECTILES, PULSE HEIGHT ANALYZERS, STEEL,
TERMINAL BALLISTICS, TEST EQUIPMENT, TEST METHODS (U)

UNBONDED STAPLE-FIBER BATTS WERE OBSERVED AS
IMPEDING PROJECTILE PENETRATION BY CAUSING IT TO
TUMBLE AS WELL AS INCREASING ITS EFFECTIVE SIZE BY
WADDING. BATTS PREPARED FROM STEEL STAPLE FIBERS
WERE INEFFECTIVE AS BALLISTIC ARMOR. HIGH-TENSILE
WIRE SCREEN IN CONJUNCTION WITH AN ORLON STAPLE
FIBER BATT INCREASES THE PROTECTIVE ABILITY OF THE
BATT ONLY WHEN IT IS PLACED BEHIND THE FIBERS. THE
BALLISTIC TEST METHOD WAS MODIFIED BY REPLACING THE
AL WITNESS PLATE WITH A DEVICE CAPABLE OF
ACCURATELY DETERMINING THE VELOCITIES OF THE
PROJECTILES WHICH COMPLETELY PENETRATE THE ARMOR
SAMPLES. USING THIS TECHNIQUE, DATA WERE OBTAINED
AND PLOTTED FOR SAMPLES OF 1.0 DPF ORLON STAPLE
FIBER BATTS, 1.5 DPF DACRON STAPLE FIBER BATTS AND
DORON BODY ARMOR. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-262 076

QUARTERMASTER RESEARCH AND ENGINEERING COMMAND NATICK
MASS

PHYSIOLOGICAL RESPONSE CHANGES OF MEN ATTRIBUTABLE TO
BODY ARMOR, SUN, AND WORK IN A NATURAL DESERT
ENVIRONMENT (INCLUDING NEGRO-WHITE DIFFERENCES) (U)

JUN 61 IV HANSON, HAROLD E.;

UNCLASSIFIED REPORT

DESCRIPTORS: *BODY ARMOR, *HEAT TOLERANCE, BODY
TEMPERATURE, CLIMATE, CLOTHING, DESERT TESTS,
EXERCISE (PHYSIOLOGY), HUMANS, PERSPIRATION,
PHYSIOLOGY (U)

SWEAT PRODUCTION, RECTAL TEMPERATURE AND PULSE RATE
WERE MEASURED OVER A 24-CONSECUTIVE-DAY PERIOD ON 16
MEN (8 WHITE AND 8 NEGRO) IN BOTH A NATURAL AND A
MODIFIED (SHADED) DESERT ENVIRONMENT. THESE
INDICES WERE USED TO DETERMINE THE EFFECT OF WEARING
BODY ARMOR, SUN, AND EXERCISE, AND TO COMPARE
PHYSIOLOGICAL RESPONSES OF PAIRED NEGRO-WHITE
SUBJECTS. WHEN AN INDIVIDUAL DONNED BODY ARMOR,
AND EXERCISED IN A NATURAL HOT-DRY DESERT
ENVIRONMENT, SIGNIFICANT INCREASES IN SWEAT
PRODUCTION, RECTAL TEMPERATURE AND PULSE RATE
OCCURRED. WHEN AN INDIVIDUAL WAS EXPOSED TO THE
SUN, SIGNIFICANT INCREASES IN SWEAT PRODUCTION
OCCURRED. WHEN AN INDIVIDUAL EXERCISED,
SIGNIFICANT INCREASES IN SWEAT PRODUCTION, RECTAL
TEMPERATURE AND PULSE RATE OCCURRED. HEAT
TOLERANCE OF FULLY-CLOTHED NEGRO AND WHITE
INDIVIDUALS WAS ABOUT EQUAL IN NATURAL HOT-DRY
SURROUNDINGS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-266 054

MELLON INST PITTSBURGH PA

BALLISTIC PROTECTIVE BUOYANT MATERIALS

(U)

OCT 61 IV JASKOWSKI, M.C.;
CONTRACT: N140 138 68879

UNCLASSIFIED REPORT

DESCRIPTORS: *BODY ARMOR, *FIBERS (SYNTHETIC), *NYLON,
*ORLON, ACRYLIC RESINS, CLEANING, CLEANING COMPOUNDS,
DACRON, EFFECTIVENESS, FIBERS, FLOTATION, MATERIALS,
PLASTICS, TERMINAL BALLISTICS, TEXTILES

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-269 577

MELLON INST PITTSBURGH PA

BALLISTIC PROTECTIVE BUOYANT MATERIALS

(U)

JAN 62 IV JASKOWSKI, M.C.;
CONTRACT: N140 138 68879

UNCLASSIFIED REPORT

DESCRIPTORS: •BODY ARMOR, •DACRON, •NYLON, •ORLON,
•PROTECTIVE CLOTHING, ACRYLIC RESINS, CLEANING, FIBERS,
FIBERS (SYNTHETIC), FLOTATION, FRAGMENTATION, MATERIALS,
PENETRATION, PLASTICS, TERMINAL BALLISTICS, TESTS,
TEXTILES

(U)

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AD-273 876

OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING
WASHINGTON D C

SYMPOSIUM ON PERSONNEL ARMOR HELD AT THE U. S. NAVAL
RESEARCH LABORATORY OCTOBER 4-5, 1961 VOLUME I (U)

61 IV

UNCLASSIFIED REPORT

DESCRIPTORS: *BODY ARMOR, *SYMPOSIA, LAMINATES, PHYSICAL
PROPERTIES, PROTECTIVE CLOTHING, SHOCK RESISTANCE,
TEXTILES (U)

CONTENTS: CHARACTERIZATION OF TEXTILE YARNS FOR
USE UNDER BALLISTIC IMPACT CONDITIONS DYNAMIC
BEHAVIOR OF TEXTILE FIBERS AND STRUCTURES AS
RELATED TO PERSONNEL ARMOR A THEORETICAL STUDY OF
PENETRATION AND RESIDUAL PROJECTILE VELOCITIES
METHOD FOR OBTAINING YIELD STRESSES AT HIGH
STRAIN RATES THE DYNAMIC PROPERTIES OF HIGH
TENACITY YARNS AND THEIR RELATIONSHIP TO BALLISTIC
RESISTANCE BUOYANT INSULATING BODY ARMORS FROM
STAPLE FIBERS SOME U. S. ARMY RESEARCH OFFICE
SPONSORED RESEARCH DEVELOPMENT OF QMC
COMPOSITE ARMOR VEST THE EFFECT OF RESIN
CONCENTRATION ON PHYSICAL PROPERTIES OF A LAMINATED
STRUCTURE FOR A CRASH AND BALLISTIC PROTECTIVE
FLIGHT HELMET A SET OF ANGLES OF OBLIQUITY FOR USE
IN ASSESSING BODY ARMOR (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-276 256

MELLON INST PITTSBURGH PA

BALLISTIC PROTECTIVE BOUYANT MATERIALS

(U)

MAY 62 IV JASKOWSKI, MICHAEL C.
CONTRACT: N140 138 68879

UNCLASSIFIED REPORT

DESCRIPTORS: *BODY ARMOR, *FIBERS (SYNTHETIC), ACRYLIC
RESINS, BALLISTICS, DACRON, FIBERS, FRAGMENTATION
AMMUNITION, MANUFACTURING, MATERIALS, PENETRATION,
PLASTICS, TEXTILES (U)

BALLISTIC PROTECTIVE BUOYANT MATERIALS: EFFECT OF FIBER
CRIMP ON PENETRATION BALLISTICS OF DACRON AND ACRYLAN
CARDED BATTS: CRIMPED FIBERS WERE SUPERIOR TO STRAIGHT OR
UNCRIMPED FIBERS IN PREVENTING PASSAGE OF FRAGMENT
SIMULATORS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-624 738 19/4 6/16
NAVAL MEDICAL FIELD RESEARCH LAB CAMP LEJEUNE N C

THE EFFECTS OF TWO TYPES OF BODY ARMOR ON BODY
TEMPERATURE. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
NOV 65 21P RASCH, PHILIP . . WHITE, PAUL
C. , JR.; NORTON, ROBERT J. ;
REPT. NO. VOL 15/NO. 24
MONITOR: NAVMED , MFO22-03-04-8001-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BODY ARMOR, BODY TEMPERATURE), (*BODY
TEMPERATURE, BODY ARMOR), HEAT, PHYSIOLOGY,
STRESS (PHYSIOLOGY), SURFACE TEMPERATURE (U)

THE PURPOSE OF THIS STUDY WAS TO DETERMINE WHETHER
THERE IS A DIFFERENCE IN THE BODY HEAT BUILD-UP UNDER
THE STANDARD MARINE CORPS UPPER TORSO BODY ARMOR
VERSUS THE NMFL LIGHTWEIGHT PROTOTYPE BODY ARMOR.
TWENTY YOUNG ADULT MARINES MADE TWO FORCED
MARCHES OF 3 MI EACH, ONE WITH EACH OF THE ABOVE
ARMORS. MEAN CHEST SKIN TEMPERATURE UNDER THE
PROTOTYPE ARMOR WAS 2F. LESS THAN UNDER THE
STANDARD ARMOR. NO DIFFERENCE WAS OBSERVED IN
RECTAL, ARM, OR ABDOMINAL TEMPERATURES. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-658 034 6/17 19/4 5/5
ARMY NATICK LABS MASS PIONEERING RESEARCH DIV

HUMAN FACTORS EVALUATION OF BODY-SUPPORTED
AIRCRAWMAN'S BUTTOCKS AND CROTCH PROTECTIVE UNITS:
(COMPARISONS OF TWO HEIGHTS OF CROTCH PROTECTOR AND
THREE SUSPENSION SYSTEMS). (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JAN 67 28P BURSE, RICHARD L. ;
REPT. NO. EPR-14
PROJ: DA-1C024701A121
TASK: 1C024701A12102
MONITOR: USA-NLABS TR-68-4-PR

UNCLASSIFIED REPORT

DESCRIPTORS: (*BODY ARMOR, *HUMAN FACTORS ENGINEERING),
(*AVIATION PERSONNEL, BODY ARMOR), DESIGN,
ACCEPTABILITY, FLIGHT CLOTHING, ANTHROPOMETRY (U)

THE RESEARCH DESCRIBED WAS AN EVALUATION OF BODY-SUPPORTED AIRCREWMEN'S BUTTOCKS AND CROTCH PROTECTIVE UNITS IN WHICH TWO HEIGHTS OF CROTCH PROTECTOR AND THREE DIFFERENT SUSPENSION SYSTEMS WERE COMPARED WITH RESPECT TO FIT, COMFORT, EASE OF USE, ESTIMATED LENGTH OF TIME THE SYSTEM COULD BE USED AND THE ADEQUACY OF SEVERAL DIMENSIONS OF THE PROTECTIVE UNITS. IN GENERAL, BOTH TYPES OF PROTECTIVE UNITS AND ALL THREE SUSPENSION SYSTEMS WERE EQUALLY SATISFACTORY. ONE TYPE OF SUSPENSION SYSTEM AND ONE HEIGHT OF CROTCH PROTECTOR WERE SIGNIFICANTLY EASIER TO USE, HOWEVER, WHILE BOTH CROTCH PROTECTORS WERE TOO WIDE. SUBJECTS DESIRED THAT THE LONGER CROTCH PROTECTOR BE SHORTENED AND THE SHORTER CROTCH PROTECTOR BE LENGTHENED TO APPROXIMATELY THE SAME LENGTH. THIS DESIRED CHANGE APPARENTLY WAS BASED ON FACTORS OTHER THAN PHYSICAL DISCOMFORT. (U)

(AUTHOR)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-672 504 19/4 6/5 1/2
AVIATION SAFETY ENGINEERING AND RESEARCH PHOENIX ARIZ
CRASHWORTHINESS OF AIRCREW PROTECTIVE ARMOR. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
APR 68 132P HALEY, JOSEPH L. , JR.;
GATLIN, CLIFFORD I. ; SCHAMADAN, JAMES L. ;
TURNBOW, JAMES W. ;
CONTRACT: DAAG17-67-C-0138
PROJ: DA-1F141812D154
MONITOR: USA-NLABS, C/OM TR-68-57-CM, 47

UNCLASSIFIED REPORT

DESCRIPTORS: (*CRASH INJURIES, FLIGHT CREWS), (*BODY
ARMOR, FLIGHT CREWS), AVIATION ACCIDENTS, IMPACT,
HELICOPTERS, DROP TESTS, SIMULATION, AIRCRAFT SEATS (U)
IDENTIFIERS: CRASHWORTHINESS (U)

THE RESULTS OF A TEST PROGRAM CONDUCTED TO
DETERMINE THE PHYSIOLOGICAL EFFECTS OF PERSONNEL
ARMOR ON AIRCREW MEMBERS EXPOSED TO AN AIRCRAFT CRASH
ENVIRONMENT ARE PRESENTED. EMPHASIS WAS PLACED ON
THE EFFECTS OF ARMOR AS WORN BY AIR CREWS IN CURRENT
MILITARY OPERATIONS. THE PROGRAM WAS DIVIDED INTO
TWO MAJOR TASKS. THE FIRST INCLUDED A LITERATURE
SEARCH TO OBTAIN DESIGN DATA ON HUMAN INJURY
SIMULATION TECHNIQUES, A CONFERENCE TO OBTAIN
INFORMATION FROM A GROUP OF COMBAT-EXPERIENCED US
ARMY MEDICAL HELICOPTER CREWMEN ON THE IMPACT
BEHAVIOR OF THE ARMOR IN OBSERVED ACCIDENTS, AND
MODIFICATIONS TO ANTHROPOMORPHIC DUMMIES TO EFFECT
RECORDINGS OF MECHANICAL 'INJURIES' TO VITAL BODY
AREAS. THE SECOND TASK CONSISTED OF THREE TYPES OF
DYNAMIC TESTS: VERTICAL DROP TOWER TESTS,
HORIZONTAL ACCELERATOR TESTS, AND A FULL-SCALE
HELICOPTER CRASH TEST. TEST RESULTS INDICATED THAT
THE POTENTIALLY DANGEROUS EFFECTS OF THE ARMOR DURING
A CRASH SITUATION ARE RELATIVELY FEW. THE MOST
SERIOUS PROBLEM APPEARS TO BE THE POSSIBLE COLLAPSE
OF THE TRACHEA FOLLOWING AN IMPACT OF THE UPPER EDGE
OF THE ARMOR WITH THE FRONT OF THE NECK.
(AUTHOR) (U)

UNCLASSIFIED

GDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-676 689 6/19 5/10 19/4
NAVAL MEDICAL FIELD RESEARCH LAB CAMP LEJEUNE N C

BODY ARMOR IN A HOT HUMID ENVIRONMENT. PART I.
STUDIES IN UNACCLIMATIZED MEN. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
SEP 68 19F YARGER, WILLIAM E. ; CRONAU,
LESLIE H. , JR. ; GOLDMAN, RALPH F. ;
REPT. NO. NMFRL-VOL-XVIII/NO-16
MONITOR: NAVMED MF12.524.007-8008-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*BODY ARMOR, TROPICAL TESTS),
PERFORMANCE(HUMAN), ACCLIMATIZATION, STRESS(PHYSIOLOGY),
HEAT TOLERANCE, PERFORMANCE(HUMAN), MOTOR REACTIONS,
PERSPIRATION, BODY TEMPERATURE, BODY WEIGHT (U)

THIS STUDY IN UNACCLIMATIZED INDIVIDUALS IS PART OF
AN OVERALL PLAN OF INVESTIGATION DESIGNED TO GIVE TO
THE FIELD COMMANDERS A REASONABLE METHOD OF
PREDICTING HEAT CASUALTIES IN THEIR MEN, KNOWING
CONDITIONS OF CLIMATE, LOAD, TERRAIN, AND THE
PRESENCE OR ABSENCE OF BODY ARMOR. (AUTHOR) (U)

UNCLASSIFIED

/ZAA14

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZAA14

AD-682 689 6/17 1974 6/19
NAVAL MEDICAL FIELD RESEARCH LAB CAMP LEJEUNE N C

BODY ARMOR IN A HOT HUMID ENVIRONMENT. PART II.
STUDIES IN HEAT ACCLIMATIZED MEN. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
JAN 69 49P YARGER, WILLIAM E. ; LITT, B.
D. ; GOLDMAN, RALPH F. ;
REPT. NO. NMFRL-VOL-XIX/NO-1
MONITOR: NAVMED MF12.524.007-8008-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO PART I, AD-676 689.

DESCRIPTORS: (•BODY ARMOR, TROPICAL TESTS),
PERFORMANCE(HUMAN), ACCLIMATIZATION, STRESS(PHYSIOLOGY),
HEAT TOLERANCE, BODY TEMPERATURE, PERSPIRATION, TROPICAL
REGIONS, METABOLISM, STATISTICAL ANALYSIS (U)

THE STANDARD ISSUE MARINE CORPS PERSONNEL BODY
ARMOR VEST (M1955) WAS TESTED FOR ITS EFFECT ON
MEN WORKING UNDER HOT HUMID CONDITIONS APPROXIMATING
THOSE SEEN IN SOUTHEAST ASIA. THIS VEST IS
LARGELY IMPERVIOUS TO THE PASSAGE OF WATER VAPOR AND
THEREBY IMPEDES EVAPORATIVE COOLING OVER THE CHEST.
BODY ARMOR PRODUCES A PRONOUNCED EFFECT REFLECTED
BY AN INCREASE IN RECTAL TEMPERATURE IN THE SUBJECTS
WHEN THEY ARE WEARING THE ARMOR. THIS EFFECT IS
RESTRICTED TO A RANGE OF ENVIRONMENT BRACKETED BY 32
TO 88F WBGT (APPROXIMATELY). BELOW THIS
LEVEL, HEAT LOSS FROM AREAS OTHER THAN THE CHEST IS
SUFFICIENT TO DISSIPATE BODY HEAT EFFECTIVELY.
ABOVE THIS RANGE, THE STRESS OF THE ENVIRONMENT IS
SO GREAT AND THE EVAPORATION OF SWEAT IS SO
INEFFICIENT THAT WEARING BODY ARMOR MAKES LITTLE
DIFFERENCE. THE EFFECT OF WEARING ARMOR IN THIS
RANGE (82-88F) IS EQUIVALENT TO A 5F INCREASE
IN THE WBGT FOR UNARMORED MEN. THE EXPERIMENT
WAS DESIGNED TO ELIMINATE THE WEIGHT OF THE ARMOR AS
A SOURCE OF DIFFERENCE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-685 838 1/2 13/12 6/17
DYNAMIC SCIENCE PHOENIX ARIZ AVSER FACILITY

A STUDY OF FORCES CAUSED BY HEAD IMPACT ON AIRCREW
PERSONNEL ARMOR UNDER SIMULATED CRASH CONDITIONS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
NOV 68 ;DBP GATLIN, CLIFFORD I. ;
SCHAMADAN, JAMES L. ;BARRON, EDWARD R. ;
TANENHOLTZ, STANLEY D. ;
CONTRACT: DAAG17-67-C-0138
PROJ: DA-1-F-141812-D-154
MONITOR: USA-NLABS, C/PLSEL TR-69-49-CE, 59

UNCLASSIFIED REPORT

DESCRIPTORS: (*AVIATION ACCIDENTS, FORCE(MECHANICS)),
(*HEAD(ANATOMY), IMPACT), (*BODY ARMOR, IMPACT TESTS),
HELMETS, TEST FACILITIES, SIMULATION, ANTHROPOMETRY,
TRACHEA, FACE(ANATOMY), CRASH INJURIES, PROBABILITY,
DECELERATION, ARMY AIRCRAFT, FLIGHT CREWS (U)
IDENTIFIERS: CRASH TESTS (U)

THE RESULTS OF A TEST PROGRAM CONDUCTED TO
DETERMINE THE MAGNITUDE, DURATION AND SHAPE OF THE
FORCE-TIME RELATIONSHIP RESULTING FROM HEAD IMPACT ON
PERSONNEL ARMOR IN A CRASH SITUATION ARE PRESENTED.
THE PROGRAM WAS DIVIDED INTO TWO MAJOR TASKS.
THE FIRST INCLUDED MODIFICATION OF AN ARMOR FRONT
TORSO PLATE TO CARRY THE TEST INSTRUMENTATION,
MODIFICATION OF THE ANTHROPOMORPHIC DUMMY TO IMPROVE
HUMAN SIMULATION, AND MODIFICATION OF THE UH-1B/
D ARMORED CREW SEAT TO PREVENT FAILURE. THE
SECOND TASK INVOLVED THE PERFORMANCE OF 12 DYNAMIC
TESTS USING TWO DIFFERENT TYPES OF AIRCREW PERSONNEL
ARMOR, BOTH WITH AND WITHOUT A PROTECTIVE HELMET.
THE TEST RESULTS INDICATED THAT SIGNIFICANT HEAD/
ARMOR IMPACT OCCURS MOST FREQUENTLY IN THE CHIN AREA.
SUCH CONTACT PRODUCED IMPACT PULSES THAT WERE
TRIANGULAR IN SHAPE WITH PEAK LOADS RANGING FROM 27
TO 500 POUNDS AND TIME DURATION RANGING FROM 0.025 TO
0.045 SECONDS. LOADS ON THE CHIN OF THIS MAGNITUDE
AND DURATION WOULD NOT BE EXPECTED TO PRODUCE SERIOUS
INJURY TO A HUMAN BEING. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-687 953 6/17
AVIATION (M L) CO LTD (GT BRIT)

PHYSIOLOGICAL COSTS OF BODY ARMOR,

(U)

69 8P GOLDMAN, RALPH F. :

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN MILITARY MEDICINE, V134 N3
P204-210 MAR 69.

DESCRIPTORS: (*BODY ARMOR, PHYSIOLOGY), PERSPIRATION,
BODY TEMPERATURE, SKIN(ANATOMY), HEAT TRANSFER,
EVAPORATION, PERFORMANCE(HUMAN), MODEL TESTS,
PERMEABILITY

(U)

THE DISCUSSION TOUCHES ON THE HEAT PRODUCTION OF
SOLDIERS CARRYING TYPICAL LOADS AND HOW THIS IS
RELATED TO MAN'S ENERGY EXPENDITURE, EXPRESSED AS
KILOCALORIES OF HEAT PRODUCTION PER HOUR PER POUND OF
WEIGHT CARRIED. THE DISCUSSION FURTHER TOUCHES ON
THE IMPERMEABILITY OF BODY ARMOR, ON SWEAT COOLING,
ON THE HEAT LOSS AS A FUNCTION OF THE CLOTHING WORN
AS EXPRESSED IN 'CLO' UNITS. DESCRIPTION OF MODEL
TESTS IS ENCLOSED. FINALLY THE DISCUSSION TOUCHES
VERY BRIEFLY ON THE EFFECTS OF PERFORATING
IMPERMEABLE MATERIALS IN ORDER TO IMPROVE THEIR
EVAPORATIVE TRANSFER CHARACTERISTICS.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-688 122 1974 5/9
ARMY NATICK LABS MASS CLOTHING AND PERSONAL LIFE SUPPORT
EQUIPMENT LAB

BODY ARMOR FOR AIRCREWMEN.

(U)

DESCRIPTIVE NOTE: SUMMARY REPT. 1962-1967,
JAN 69 31P BARRON, EDWARD R. ; ALES, I,
ANTHONY L. ; PARK, ALICE F. ;
REPT. NO. C/ED-50
PROJ: DA-1-F-164204-D-154
MONITOR: USA-NLABS TR-69-43-CE

UNCLASSIFIED REPORT

DESCRIPTORS: (*FLIGHT CREWS, *BODY ARMOR), (*AERIAL
GUNNERY, PROTECTION), DESIGN, COMPOSITE MATERIALS, GLASS
TEXTILES, CERAMIC MATERIALS, COMPATIBILITY (U)

BODY ARMOR WHICH PROTECTS ARMY AIRCREWS OF LOW-
FLYING AIRCRAFT AGAINST 7.62 MM/CALIBER .30 AP
SMALL ARMS GROUND FIRE HAS BEEN DEVELOPED BY THE U.
S. ARMY NATICK LABORATORIES. THE ARMOR
UTILIZES A RELATIVELY LIGHTWEIGHT COMPOSITE OF
CERAMIC BONDED TO FIBERGLASS. THE U. S. ARMY
NATICK LABORATORIES IMPROVED ON EARLIER CERAMIC
COMPOSITE ARMOR MADE OF FLAT, MULTIPLE CERAMIC TILES
BY DEVELOPING SEPARATE FRONT AND BACK ONE-PIECE
COMPOSITE PANELS WHICH ARE CURVED TO FIT THE TORSO.
A CLOTH CARRIER WITH LARGE FRONT AND BACK POCKETS
WAS DESIGNED TO HOLD THE ARMOR PANELS, PERMITTING THE
AIRMAN TO WEAR THE ARMOR COMFORTABLY AND WITHOUT
INTERFERENCE WITH HIS OPERATIONS. EXPERIMENTAL
ARMOR FOR LEG PROTECTION AGAINST SMALL ARMS WEAPONS
HAS ALSO BEEN MADE OF THE CERAMIC COMPOSITE.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-871 075 6.4 6.17 6.17 6.17
ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT
PARIS (FRANCE)

PATTERN RECOGNITION. BODY ARMOUR AND AIRCREW
EQUIPMENT ASSEMBLIES. CURRENT SPACE MEDICAL
PROBLEMS. AEROMEDICAL EVACUATION. (U)

DESCRIPTIVE NOTE: CONFERENCE PROCEEDINGS.

OCT 68 288P

REPT. NO. AGARD-CP-41

UNCLASSIFIED REPORT

DESCRIPTORS: (*PATTERN RECOGNITION, SYMPOSIA), (*BODY
ARMOR, SYMPOSIA), (*AEROSPACE MEDICINE, SYMPOSIA),
(*EVACUATION, SYMPOSIA), TARGET ACQUISITION, PROTECTIVE
CLOTHING, CONTROLLED ATMOSPHERES, AIR TRANSPORTATION,
FLASHBLINDNESS, LIFE SUPPORT, AIR FORCE OPERATIONS (U)

THE VOLUME CONTAINS THE TEXT OF 29 PAPERS PRESENTED
AT THE 25TH MEETING OF THE AEROSPACE MEDICAL
PANEL OF AGARD. THE PAPERS ARE GROUPED UNDER
THE FOUR SUBJECT HEADINGS COVERED IN THE PROGRAM,
NAMELY, PATTERN RECOGNITION, BODY ARMOUR AND AIRCREW
EQUIPMENT ASSEMBLIES, CURRENT SPACE MEDICAL PROBLEMS
AND AEROMEDICAL EVACUATION. IN ADDITION, THERE IS
A TECHNICAL SUMMARY WHICH INCLUDES INFORMATION
DERIVED FROM THE DISCUSSIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-691 739 1974
IIT RESEARCH INST CHICAGO ILL

CONSTRUCTION OF BALLISTIC MATERIAL SAMPLES FOR
AIRCREW ARMOR SYSTEMS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,

JAN 69 28P RODZEN, R. A. ; LAMBER, C.

F. ; SCRIBANO, F. C. ; BURNS, M. ;

CONTRACT: DA-19-129-AMC-641(N)

PROJ: DA-1-F-162203-A-150

TASK: 1-F-162203-A-15004

MONITOR: USA-NLABS, C/PLSEL

TR-69-61-CE.62

UNCLASSIFIED REPORT

DESCRIPTORS: (*BODY ARMOR, *FLIGHT CREWS), (*CERAMIC
MATERIALS, BODY ARMOR), MANUFACTURING, ALUMINA,
MOLDINGS, CONFIGURATION

(U)

IDENTIFIERS: *ARMOR, *CERAMIC MATERIALS

(U)

THE REPORT DESCRIBES THE INVESTIGATIVE, RESEARCH
AND EXPERIMENTAL EFFORT NECESSARY TO VERIFY THE
COMMERCIAL PRODUCIBILITY OF THE AIRCREW ARMOR
CONFIGURATIONS DEVELOPED UNDER THE CONTRACT. THIS
WAS A COOPERATIVE EFFORT WITH INDUSTRY, TO IDENTIFY
TYPICAL PROBLEM AREAS, SOLUTIONS AND COMPROMISES
NECESSARY TO MAKE SUCH ARMOR PRODUCIBLE. ALSO
DESCRIBED AND ILLUSTRATED ARE THE CERAMIC SAMPLES
WHICH WERE FABRICATED TO VERIFY PRODUCIBILITY OF THE
ARMOR CONFIGURATIONS. (AUTHOR)

(U)

UNCLASSIFIED

/ZAA14

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-695 644 1974 11/5
TEXTILE RESEARCH INST PRINCETON N J

A STUDY OF FELTS FOR PERSONAL ARMOR. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
AUG 69 29P LYONS, W. JAMES ; SCARDINO,
FRANK L. ; GOSWAMI, B. C. ;
CONTRACT: JAAG17-68-C0040
PROJ: DA-1-M-624101-D-504
MONITOR: USA-NLABS, C/PLSEL TR-70-13-CE, TS-164

UNCLASSIFIED REPORT

DESCRIPTORS: (•BODY ARMOR, TEXTILES), SYNTHETIC FIBERS,
GEOMETRIC FORMS, MECHANICAL PROPERTIES, MANUFACTURING,
SURFACE ROUGHNESS, FRICTION, TEST METHODS, RUPTURE-
NYLON, PROPENES, TENSILE PROPERTIES, PROTECTION,
POLYETHYLENE PLASTICS (U)
IDENTIFIERS: COHESION, FELTS, POLYPROPYLENE
FIBERS (U)

THE STUDY WAS CONCERNED WITH THE INFLUENCE OF
VARIOUS GEOMETRIC AND MECHANICAL CHARACTERISTICS OF
THE CONSTITUENT FIBERS, AND SOME PROCESSING FACTORS
SUCH AS THE AMOUNT OF NEEDLING AND THE BLENDING OF
FIBERS, ON THE COHESION OF NEEDLE FELTS. TESTS
WERE CONDUCTED ON SINGLE FIBERS FOR SURFACE-ROUGHNESS
AND FRICTIONAL FORCE CHARACTERISTICS AND MECHANICAL
PROPERTIES. LENGTH ANALYSES WERE ALSO MADE ON
GROUPS OF FIBER SAMPLES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-696 481 1974 5/9
ARMY NATICK LABS MASS PIONEERING RESEARCH LAB

EVALUATION ON ARMY AIRCREW PROTECTIVE ARMOR IN
VIETNAM.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,

JUN 59 60P MCGINNIS, JOHN M. ;BURSE,
RICHARD L. ;BARRON, EDWARD R. ;
REPT. NO. EPT-9
PROJ: DA-1-C-624701-A-121
TASK: 1C024701A12102
MONITOR: USA-NLABS TR-69-79-PR

UNCLASSIFIED REPORT

DESCRIPTORS: (•AERIAL WARFARE, VIETNAM), (•PILOTS, BODY
ARMOR), (•BODY ARMOR, COMPATIBILITY), HUMAN FACTORS
ENGINEERING, HELICOPTERS, ARMOR PIERCING AMMUNITION,
ACCEPTABILITY (U)
IDENTIFIERS: EVALUATION (U)

THIRTY FIVE U. S. ARMY HELICOPTER CREW
MEMBERS EVALUATED THE DESIGN FEATURES AND
ACCEPTABILITY OF .30 CALIBER ARMOR-PIERCING
PROTECTIVE ARMOR ON PRACTICE OR ACTUAL LIVE-FIRE
AERIAL MISSIONS IN SOUTH VIETNAM. TWENTY
PILOTS USED TORSO FRONT PROTECTIVE ARMOR, AND
15 CREW CHIEFS AND DOOR GUNNERS USED TORSO FRONT
PROTECTIVE ARMOR, TORSO BACK PROTECTIVE
ARMOR AND SEAT/GROIN PROTECTIVE UNITS.
THEY RATED THE FOLLOWING VARIABLES: FIT,
COMFORT, INTERFERENCE WITH MOVEMENT, SUITABILITY OF
OUTLINE AND CONTOUR, ACCEPTABILITY OF ARMOR BEFORE
AND AFTER EXPERIENCE WITH THE LATEST ITEMS,
DESIRABILITY OF PARTICULAR ITEMS ON PARTICULAR
MISSIONS AND BODY AREAS REQUIRING PROTECTION.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-707 910 11/5 19/4
ARMY NATIC LABS MASS CLOTHING AND PERSONAL LIFE SUPPORT
EQUIPMENT LAB

A REVIEW OF THE DEVELOPMENT OF BALLISTIC NEEDLE-
PUNCHED FELTS.

(U)

DESCRIPTIVE NOTE: SUMMARY REPT. 1961-69,
OCT 69 56P LAIRLE, ROY C. HENRY,
MALCOLM C. ;

REPT. NO. C/PSEL-TS-167
PROJ: DA-1-T-062105-A-329
TASK: 1-T-062105-A-32902
MONITOR: USA-NLAAS

TR-70-32-CE

UNCLASSIFIED REPORT

DESCRIPTORS: (*TEXTILES, *BODY ARMOR), TERMINAL
BALLISTICS, DENSITY, MANUFACTURING, THICKNESS
IDENTIFIERS: *FELTS

(U)

(U)

AS PART OF THE CONTINUING EFFORT TO IMPROVE
BALLISTIC MATERIALS FOR PERSONNEL ARMOR, THE FIBER
AND FABRICATION PARAMETERS, DYNAMICS OF FELT IMPACT,
AND PREDICTIVE EQUATIONS ATTEMPTING TO CONNECT
BALLISTIC RESISTANCE TO KNOWN MEASURABLE PARAMETERS
WERE REVIEWED FOR NEEDLE-PUNCHED FELTS. THE
BALLISTIC RESISTANCE OF NEEDLE-PUNCHED FELTS AT LOW
AREAL DENSITIES WAS FOUND TO BE SUPERIOR TO THAT OF
ANY OTHER KNOWN MATERIAL. ON THE OTHER HAND, AT
INCREASED AREAL DENSITIES AND AGAINST HIGHER VELOCITY
MISSILES, OTHER MATERIALS BECOME COMPETITIVE. THE
EXTENT TO WHICH NEEDLE-PUNCHED FELTS MAINTAIN THEIR
SUPERIORITY TO OTHER MATERIALS AT MODERATE AREAL
DENSITIES IS DEPENDENT UPON CERTAIN FIBER AND
FABRICATION PROPERTIES. THE HIGHEST TENACITY
POLYAMIDE FIBERS ARE CURRENTLY THE BEST AVAILABLE
MATERIAL. IN THE CASE OF FABRICATION, A RELATIVELY
LOW DEGREE OF NEEDLING FURNISHES THE BEST BALLISTIC
PROPERTIES. IN GENERAL, THE THICKER THE FELT THAT
CAN BE TOLERATED (AT THE SAME WEIGHT AND AREAL
DENSITY), THE BETTER THE BALLISTIC RESISTANCE. IN
ADDITION, IT IS APPARENT THAT THE LEVEL OF BALLISTIC
PROTECTION VARIES DEPENDING UPON THE METHOD OF
ATTAINING THE DESIRED THICKNESS. THE NEED IS SHOWN
FOR ADDITIONAL WORK TO DETERMINE THE EFFECT OF FIBER
PROPERTIES SUCH AS FIBER DENIER, MOLECULAR WEIGHT,
MOLECULAR WEIGHT DISTRIBUTION, AND ELONGATION UPON
THE BALLISTIC PROPERTIES OF THE RESULTING FELTS.

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UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-711 876 1974 5/5 14/2
IIT RESEARCH INST CHICAGO ILL

DESIGN, DEVELOPMENT AND FABRICATION OF A PERSONNEL
ARMOR LOAD PROFILE ANALYZER. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
APR 70 100P SCHIBANO, F. ; BURNS, M. ;
BARRON, E. R. ;
CONTRACT: DAAG17-69-C-0008
PROJ: DA-1-F-164204-D-154, IITRI-J6162-FR
MONITOR: USA-NLABS, C/PLSEL TR-70-65-CE, 75

UNCLASSIFIED REPORT

DESCRIPTORS: (*BODY ARMOR, *DETECTORS), ANTHROPOMETRY,
PERFORMANCE(HUMAN), POSITIONING REACTIONS, LOAD
DISTRIBUTION, DISPLAY SYSTEMS, RELIABILITY(ELECTRONICS),
PSYCHOPHYSIOLOGY, PERCEPTION, SENSITIVITY (U)

THE PURPOSE OF THE PROGRAM WAS TO DESIGN, DEVELOP,
AND FABRICATE AN INSTRUMENT WHICH COULD LOCATE AND
SENSE LOADS INDUCED ON THE BODY OF A PERSON WEARING
PROTECTIVE ARMOR, AND TO COMPARE SUSPENSIONS AND
SUGGEST IMPROVEMENTS WHICH COULD BE INCORPORATED IN
CURRENT OR FUTURE LOAD-CARRYING SYSTEMS. THE
DEVELOPMENT OF A 'PERSONNEL ARMOR LOAD
PROFILE ANALYZER' SAW THE ATTAINMENT OF A METHOD
OF SENSING LOADS, THE INTEGRATION AND POSITIONING OF
SENSORS IN A SUITABLE GARMENT, A METHOD OF DISPLAYING
INFORMATION, AND THE CORRELATION OF OUTPUT DATA TO
TORSO SENSITIVITY. IT WAS FOUND THAT ARMOR
SUSPENSION SYSTEMS COULD EFFECTIVELY BE EVALUATED
USING THIS INSTRUMENT. STATIC AND DYNAMIC LOAD
PATTERNS WERE DISPLAYED AND THE SHIFT IN THESE
PATTERNS WITH ARTICULATION COULD BE OBSERVED. THE
DATA OBTAINED FROM THE DISPLAY COULD PROVIDE
GUIDELINES FOR IMPROVING SUSPENSION SYSTEM DESIGN BY
DETERMINING WHETHER A PARTICULAR SUSPENSION WAS
EFFECTIVE IN DISTRIBUTING LOADS ON THE OPTIMUM LOAD-
BEARING AREAS OF THE TORSO. THE PROGRESSIVE
ELECTRICAL CONTACT SENSOR APPROACH PROVIDED A DIRECT
READING SYSTEM WITH MAXIMUM RELIABILITY, RUGGEDNESS,
AND VERSATILITY. IN ADDITION, THE SYSTEM DID NOT
REQUIRE SPECIAL SIGNAL CONDITIONING EQUIPMENT. THE
VARIABLE INDUCTANCE SENSOR APPROACH PRODUCED AN
ANALOG SENSOR OUTPUT CONVERTED TO A DIGITAL DISPLAY.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-713 016 1974
IIT RESEARCH INST CHICAGO ILL

ADVANCED AIRCREW ARMOR SUSPENSION SYSTEMS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 7 AUG 68-30 APR 69,
JAN 70 96F SCRIBANO, FRANK C. BURNS,
MARVIN ;

CONTRACT: JAAG17-68-C-0029

PROJ: DA-1-F-162203-A-150, IITRI-J6053

MONITOR: USA-HLABS, C/PLSEL

TR-70-51-CE, 74

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, SUSPENSION DEVICES), FLIGHT
CREWS, CONFIGURATION, OPTIMIZATION, DESIGN (U)

THE IMPROVEMENT OF AIRCREW ARMOR SUSPENSION SYSTEMS WAS THE GOAL OF THIS PROJECT. DEFICIENCIES IN ARMOR CARRIERS WERE RECOGNIZED IN EARLIER ARMOR PROGRAMS. ATTEMPTS WERE MADE TO ELIMINATE THESE DEFICIENCIES, BUT THE RESULTS WERE MINIMAL SINCE THE MAJOR DESIGN EFFORT WAS FOCUSED ON THE OPTIMIZATION OF ARMOR CONFIGURATIONS AND THE DEVELOPMENT OF AN ARMOR SIZING SYSTEM. ARMOR SUSPENSION SYSTEMS RECEIVED PRIME CONSIDERATION IN THIS PROGRAM, AND THE GOALS WERE TO DESIGN THOSE WHICH WOULD IMPROVE COMFORT, MOBILITY, PERIPHERAL PROTECTION, VENTILATION, AND RAPID DOFFING CHARACTERISTICS WERE ALSO GIVEN CONSIDERATION. THE SUSPENSION AND LOAD DISTRIBUTION PRINCIPLES USED IN OTHER FIELDS INVOLVING LOAD-BEARING EQUIPMENT WERE SURVEYED AND APPLIED WHEREVER PRACTICABLE IN THE IMPROVEMENT OF ARMOR SUSPENSIONS. THE AIRCREW ARMOR SUSPENSION SYSTEMS DESIGNED, DEVELOPED AND FABRICATED DURING THE STUDY INDICATE SIGNIFICANT ADVANCES OVER PREVIOUS ARMOR CARRIERS. THE SUSPENSION CONCEPTS DEVELOPED ARE REVIEWED. THE PROTOTYPES INCORPORATING THE SUSPENSION TECHNIQUES DERIVED FROM THE STUDY ARE DISCUSSED IN DETAIL, AND THE RESULTS OF A PROTOTYPE EVALUATION STUDY CONDUCTED ON A GROUP OF TEST SUBJECTS ARE PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-719 212 1974 14/2
ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND
MD

BALLISTIC TESTING OF PERSONNEL ARMOR
MATERIALS.

(U)

DESCRIPTIVE NOTE: MATERIEL TEST PROCEDURE.

OCT 68 19P
REPT. NO. MTP-10-2-506

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUPERSEDES ORDNANCE PROOF MANUAL
50-30.

DESCRIPTORS: (•BODY ARMOR, TEST METHODS), PENETRATION,
PROJECTILES, PROTECTION (U)

IDENTIFIERS: BALLISTICS, PROTECTION, COMMON
ENGINEERING TEST PROCEDURES (U)

THE OBJECTIVE OF THIS TEST PROCEDURE IS TO EVALUATE
THE RESISTANCE OF THE MATERIAL USED IN PERSONNEL
ARMOR TO PENETRATION BY PROJECTILE FRAGMENTS AND
SMALL ARMS AMMUNITION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-719 551 1974
ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER CHARLOTTESVILLE
VA

KNIGHTS OF THE TWENTIETH CENTURY (RYTSALI
DVADTSATEGO VEKA),

(U)

SEP 70 14P ZHOLONDKOVSKII, O. ;
REPT. NO. FSTC-HI-23-1051-70

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. FROM TEKNIKA MOLODEZHI
(USSR) V37 N11 1969.

DESCRIPTORS: (BODY ARMOR, HISTORY); USSR
IDENTIFIERS: TRANSLATIONS

(U)

(U)

THE REPORT TRACES THE DEVELOPMENT OF PROTECTIVE
ARMOR WORN BY SOLDIERS FROM ANCIENT TIMES TO THE
PRESENT. ARMOR WAS WIDELY UTILIZED DURING THE
MIDDLE AGES, BUT ITS USE DECLINED AS FIREARMS BECAME
MORE SOPHISTICATED. WORLD WAR I, HOWEVER, SAW
THE RETURN OF PROTECTIVE PLATES AND HELMETS. THE
BRITISH FIRM OF BARRATS WAS ESPECIALLY NOTED FOR
ITS PRODUCTION OF BULLET-PROOF VESTS AND STEEL
DERBYS. DURING WORLD WAR II BULLET PROOF
ARMOR WAS ADOPTED BY INDIVIDUAL UNITS OF THE SOVIET
ARMY. STEEL ARMOR COVERED THE CHEST, STOMACH,
AND BACK OF RED SOLDIERS. RUSSIAN HELMETS ALSO
PROVED TO BE VERY GOOD; THEY HAVE BEEN RETAINED
WITHOUT CHANGE UP TO OUR TIME. WITH THE DEVELOPMENT
OF POLYMER CHEMISTRY, EXPERIMENTS ON THE COMPOSITION
OF HELMETS MADE FROM NEW, SYNTHETIC MATERIALS BEGAN
TO BE CONDUCTED IN MANY ARMIES OF THE WORLD.
SCIENTIFIC RESEARCH CENTERS ARE ALSO MAKING
MILITARY ARMOR VESTS. DESIGNERS ARE ALSO CONCERNED
ABOUT SOLDIERS FEET; A STEEL, V-SHAPED PLATE IS
ATTACHED TO THE SOLE OF BOOTS TO REFLECT SHRAPNEL
FROM ANTIPERSONNEL MINES. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-726 918 1974 11/5
UNIRGYAL INC WAYNE N J

BICOMPONENT AND BICONSTITUENT FIBERS IN
BALLISTIC FABRIC FOR PERSONNEL ARMOR.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
APR 71 27P OLSON, M. W. ; BRICE, G. H.

CONTRACT: DAAG17-70-C-0032

PROJ: DA-1-T-062105-A-329

MONITOR: USA-NLASS, C/PLSEL

TR-71-48-CE,

TS-173

UNCLASSIFIED REPORT

DESCRIPTORS: (*BODY ARMOR, *SYNTHETIC FIBERS),
(*TEXTILES, BODY ARMOR), POLYESTER PLASTICS, NYLON,
POLYETHYLENE PLASTICS, MIXTURES

(U)

IDENTIFIERS: POLYESTER FIBERS, POLYPROPYLENE
FIBERS

(U)

EXPERIMENTAL FIBERS HAVE BEEN SPUN FROM INTIMATE MIXTURES OF NYLON, POLYPROPYLENE AND POLYESTER PLASTICS (BICONSTITUENT TYPE) FOLLOWING AN EXTENSIVE SCREENING PROGRAM TO DETERMINE COMPATIBILITIES. FIBERS OF THE BICOMPONENT TYPE (SHELL/CORE AND BILATERAL) HAVE ALSO BEEN SPUN FROM SEVERAL COMBINATIONS. A TOTAL OF SIX COMBINATIONS OF BOTH TYPES PLUS A 100% NYLON CONTROL HAVE BEEN SPUN IN SUFFICIENT QUANTITY TO BE WOVEN INTO BALLISTIC FABRIC AND TESTED ON A FIRING RANGE. ALL SEVEN FABRICS SHOWED AN APPRECIABLY LOWER BALLISTIC RESISTANCE (V50) THAN A STANDARD NYLON BALLISTIC FABRIC BUT PROCESSING DIFFICULTIES DURING THE SPINNING OPERATION MAY HAVE BEEN RESPONSIBLE, AT LEAST IN PART, FOR THE POOR SHOWING. WHEN COMPARISONS ARE MADE WITHIN THE SERIES THERE IS EVIDENCE THAT A SHELL/CORE FIBER MADE FROM NYLON AND POLYPROPYLENE COULD BE DEVELOPED INTO AN IMPROVED BALLISTIC FABRIC. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-729 353 1974
ARMY NATICK LABS MASS CLOTHING AND PERSONAL LIFE SUPPORT
EQUIPMENT LAB

A HISTORY OF THE DEVELOPMENT OF AN ARMOR
ENSEMBLE FOR MINE CLEARANCE PERSONNEL. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
OCT 70 40P LASTNIK, ABRAHAM L. ;
REPT. NO. C/PLSEL-64
MONITOR: USA-NLABS TR-71-30-CE

UNCLASSIFIED REPORT

DESCRIPTORS: (•BODY ARMOR, •MINE CLEARANCE), MILITARY
REQUIREMENTS, HAZARDS, SAFETY, PROTECTIVE CLOTHING,
MATERIALS, MANUFACTURING METHODS (U)

MINE CLEARANCE TEAMS HAVE ALWAYS TRIED TO ADAPT
AVAILABLE ARMOR CLOTHING TO THEIR OPERATIONS WITH
VARYING DEGREES OF SUCCESS. THE REPORT IS
CONCERNED WITH THE HISTORY OF THE DEVELOPMENT OF A
FULL BODY COVERAGE ARMOR FOR MINE CLEARANCE PERSONNEL
TO SATISFY MILITARY REQUIREMENTS. DISCUSSIONS ARE
CONCERNED WITH THE HAZARDS OF MINE CLEARANCE
VULNERABLE BODY AREAS, OPERATIONAL CONCEPTS, DESIGN,
PROTECTIVE CHARACTERISTICS AND FABRICATION OF THE
ENSEMBLE, AND ITS EVALUATION. A SUMMARY OF RECENT
ARMOR MATERIAL DEVELOPMENTS AND TYPICAL APPLICATIONS
IS INCLUDED. THESE MATERIALS MAY BE APPLIED TO ANY
FUTURE CONCEPTS FOR FULL BODY ARMOR. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-730 775 11/5 18/4
MONSANTO RESEARCH CORP DURHAM N C

EXPERIMENTAL ORGANIC FIBER MATERIALS FOR
PERSONNEL ARMOR.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,

JAN 71 44P LILYQUIST, MARVIN R. ;

CONTRACT: DAAG17-69-C0079

PROJ: DA-1-J-662708-DJ-40

MONITOR: USA-NLABS, C/PLSEL

TR-71-47-CE,

TS-177

UNCLASSIFIED REPORT

DESCRIPTORS: (•BODY ARMOR, •FIBERS(SYNTHETIC)), TERMINAL
BALLISTICS, TENSILE PROPERTIES, MODULUS OF ELASTICITY,
PLASTICS, LAMINATES, DENSITY, TEXTILES, DUCTILITY (U)
IDENTIFIERS: EVALUATION, FELTS (U)

A NEW HIGH PERFORMANCE ORGANIC FIBER HAVING AN
UNUSUALLY BROAD RANGE OF POSSIBLE FIBER PHYSICAL
PROPERTIES, DESIGNATED AS X-500, WAS STUDIED IN
VARIOUS CONSTRUCTIONS FOR BALLISTIC PERFORMANCE AS A
POSSIBLE MATERIAL FOR IMPROVING PERSONAL BODY ARMOR.
TENSILE PROPERTIES OF THIS FIBER SPAN A WIDE RANGE
OF VALUES FROM THOSE SIMILAR TO NYLON AND POLYESTER
TO THOSE SIMILAR TO FIBERGLASS. THE MODULUS,
HOWEVER, IS HIGHER THAN THAT FOR NYLON OR POLYESTER
FIBERS. THREE TYPES OF THIS FIBER WERE SPUN HAVING
SINGLE FILAMENT PROPERTIES SPANNING THE ACHIEVABLE
RANGE OF THE X-500 FIBER SYSTEM. WORK WAS DIVIDED
INTO FOUR DISTINCT PHASES OF EVALUATION: FIBER
YARN; BALLISTIC FABRIC; BALLISTIC FELTS; AND
BALLISTIC FABRIC-RESIN LAMINATES. IN EACH PHASE,
SAMPLES WERE TESTED USING EXISTING BALLISTIC
MATERIALS SPECIFICATIONS AS GUIDELINES.
(AUTHOR)

(U)

UNCLASSIFIED

GDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-731 000 6/7 1974
MONSANTO RESEARCH CORP DAYTON OHIO

FOAM FLOTATION SYSTEMS FOR PERSONNEL
WEARING BODY ARMOR.

(U)

DESCRIPTIVE NOTE: FINAL REPT. FEB 69-SEP 70,
JUL 71 114P SALTER, I. O. ; SCHWENDEMAN,
J. L. ; WOJTOVICZ, A. ; JEFFERSON, R. T. ; SUN,
S. M. ;

CONTRACT: DAAG17-69-C-0017

PROJ: DA-1-F-164207-DC-52

MONITOR: USA-NLABS, C/PLSEL

72-3-CE, 87

UNCLASSIFIED REPORT

DESCRIPTORS: (*BODY ARMOR, *FLOTATION), (*EXPANDED
PLASTICS, FLOTATION), (*FOAMS, FLOTATION), (*SEA RESCUE
EQUIPMENT, FEASIBILITY STUDIES), AIR FORCE PERSONNEL,
AIR-SEA RESCUES, PLASTICS (U)
IDENTIFIERS: POLYURETHANE FOAMS, URETHANES (U)

A FEASIBILITY STUDY WAS CONDUCTED ON APPROACHES TO
USING FOAMS IN FLOTATION SYSTEMS FOR PERSONNEL
WEARING BODY ARMOR. FLOTATION SYSTEMS SHOULD BE
RAPIDLY DEPLOYABLE (10 SECONDS) AND PROVIDE
FLOTATION FOR AT LEAST SIX HOURS, EVEN IF DAMAGED.
THESE SYSTEMS SHOULD NOT INTERFERE WITH THE WEARER
AS HE PERFORMS HIS DUTIES. THREE APPROACHES WERE
INVESTIGATED: (1) THE USE OF PREFORMED FLEXIBLE
FOAM; (2) INSTANTLY GENERATED POLYSTYRENE FOAM;
AND (3) FAST REACTING TWO-COMPONENT URETHANE
FOAMS. ONLY THE PREFORMED FLEXIBLE FOAM PERFORMED
WELL WHEN FABRICATED INTO A JACKET AND TESTED ON A
MAN. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-737 725 11/5 1974
UNIVERSITY OF MANCHESTER INST OF SCIENCE AND TECHNOLOGY
(ENGLAND)

RESEARCH ON ENERGY ABSORPTION BY NONWOVEN
FABRICS.

(U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. OCT 70-SEP 71,
NOV 71 46P HEARLE, J. W. S. PURDY,

A. T. ;

CONTRACT: DAJA37-71-C-0554

PROJ: DA-1-J-662708-D-504

UNCLASSIFIED REPORT

DESCRIPTORS: (*TEXTILES, *TERMINAL BALLISTICS), (*BODY
ARMOR, COMPOSITE MATERIALS), PROJECTILES, PENETRATION,
TESTS, DEFORMATION, SHOCK RESISTANCE, TENSILE
PROPERTIES, THICKNESS, GREAT BRITAIN (U)
IDENTIFIERS: ENERGY ABSORBERS (U)

THE OBJECT OF THE WORK HAS BEEN TO GAIN A GREATER
UNDERSTANDING OF THE MEANS BY WHICH NEEDLED FABRIC
ABSORBS ENERGY WHEN STRUCK TRANSVERSELY BY A
PROJECTILE. NEEDLE PUNCHED FABRIC HAS BEEN
SUBJECTED TO A SLOW SPEED PENETRATION TEST USING A
RIGID STEEL PROBE, AND TO IMPACT WITH A FREE FLYING
PROJECTILE. THE FIRST METHOD OF TEST HELPED
ESTABLISH THE MECHANISM BY WHICH THIS MATERIAL
DEFORMS DURING IMPACT. DURING HIGH SPEED TESTS
DEFORMATION WAS STUDIED USING HIGH SPEED CINE
PHOTOGRAPHY AND VARIOUS PHENOMENA OBSERVED.
DETAILED OBSERVATION OF FABRIC BEHAVIOUR AROUND THE
IMPACT POINT WHEN MULTILAYER SAMPLES ARE IN USE HAS
BEEN CARRIED OUT USING AN EMBEDDING AND SECTIONING
TECHNIQUE. PROJECTILES EXTEND FABRIC UNTIL
THICKNESS IS REDUCED AND NO FURTHER RESISTANCE IS
OFFERED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-751 155 1974 14/2
ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND
MD

BODY ARMOR. (U)

DESCRIPTIVE NOTE: FINAL REPT. ON TEST OPERATIONS
PROCEDURE.

JUL 72 16P
REPT NO. TOP-10-3-022

UNCLASSIFIED REPORT

DESCRIPTORS: (•BODY ARMOR, TEST METHODS), SAFETY,
MILITARY TRAINING, TESTS, RELIABILITY, HUMAN FACTORS
ENGINEERING (U)

THE DOCUMENT DESCRIBES A METHOD FOR EVALUATION OF
BODY ARMOR FUNCTIONAL PERFORMANCE CHARACTERISTICS.
IT IDENTIFIES SUPPORTING TESTS, FACILITIES, AND
EQUIPMENT REQUIRED, AND PROVIDES PROCEDURES FOR
PREOPERATIONAL INSPECTION, PHYSICAL CHARACTERISTICS,
SAFETY, PERSONNEL TRAINING, SIZING, FITTING,
COMPATIBILITY WITH COMBAT TASKS, DURABILITY,
RELIABILITY, CARE, MAINTENANCE, HUMAN FACTORS, AND
VALUE ANALYSIS. APPRECIABLE TO BODY ARMOR DESIGNED
FOR PROTECTION OF SELECTED AREAS FROM THE NECK TO THE
ANKLES. EXCLUDES HEAD ARMOR, FOOT ARMOR, AND
BALLISTIC TESTING. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-752 792 1974

NAVY CLOTHING AND TEXTILE RESEARCH UNIT NATICK MASS

THE DEVELOPMENT OF A NAVY, BUOYANT, ANTI-FRAGMENT, BULLETPROOF VEST: PROTECTION AGAINST LOW-VELOCITY FRAGMENTS, SECONDARY (SPALL) FRAGMENT DAMAGE, AND 30-CALIBER-BALL PROJECTILES.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,

NAV 72 29P SILVIA, JOHN ; KEINS, DALE A.

; SHARPINE, JAMES C. ;

REPT. NO. 1R-105, 2-72

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, DESIGN), NAVAL EQUIPMENT, PROTECTIVE CLOTHING, ARMOR PLATE, BUOYANCY, STRESS (PHYSIOLOGY), TEST METHODS

(U)

THE NAVY CLOTHING AND TEXTILE RESEARCH UNIT HAS DEVELOPED TWO, EXPERIMENTAL, BUOYANT, ANTI-FRAGMENT, BULLETPROOF VESTS WHICH PROVIDE LOW-VELOCITY PROTECTION AGAINST MORTAR SHELL BURSTS AND SECONDARY FRAGMENTS (SPALL), PROVIDE PROTECTION AGAINST 30-CALIBER, SMALL-ARMS FIRE AND PROVIDE EMERGENCY, INHERENT BUOYANCY. EACH MODEL CONSISTS OF A CARRIER WHICH HAS FRONT AND BACK PANELS THAT CONTAIN A 30-CALIBER-BALL, BODY-ARMOR PLATE, A COMBINATION OF FELT AND/OR WOVEN BALLISTIC MATERIALS AND LAYERS OF BUOYANT, UNICELLULAR FOAM.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-752 903 5/9 5/5 19/4
HUMAN ENGINEERING LAB ABERDEEN PROVING GROUND MD

EVALUATION OF RIFLE-FIRING BEHAVIOR OF
TROOPS EQUIPPED WITH BODY ARMOR: A
PILOT STUDY.

(U)

DESCRIPTIVE NOTE: TECHNICAL NOTE,
SEP 72 13P CORONA, BERNARD M. ILLIS,
PAUL H. JONES, R. DOUGLAS I. PANDALL, R.
BRADLEY I. SCHLETZ, MAYDEN A. I.
REPT. NO. HEL-TN-14-72

UNCLASSIFIED REPORT

DESCRIPTORS: (ARMY PERSONNEL, PERFORMANCE(HUMAN)),
(BODY ARMOR, ARMY PERSONNEL), ADAPTATION(PHYSIOLOGY),
REACTION(PSYCHOLOGY), PERFORMANCE(HUMAN),
ADJUSTMENT(PSYCHOLOGY), FIRING TESTS(ORDNANCE), ANALYSIS
OF VARIANCE, HUMAN FACTORS ENGINEERING (U)
IDENTIFIERS: EVALUATION (U)

TWENTY ENLISTED MEN, EQUIPPED WITH TWO TYPES OF
BODY ARMOR FIRED THE M16 AT POP-UP TARGETS. THE
RANGE WAS ELECTRONICALLY INSTRUMENTED TO RECORD SHOTS
AND HITS, AS WELL AS RELATIONSHIPS BETWEEN THESE
EVENTS. EACH SUBJECT FIRED 180 ROUNDS AT TARGETS
WHICH APPEARED FOR TWO, FOUR AND SIX-SECOND
PRESENTATION INTERVALS. THE RESULTS SHOWED NO
SIGNIFICANT DIFFERENCE BETWEEN STANDARD NYLON VEST,
NYLON TITANIUM VEST OR NO-VEST CONDITIONS AS SUBJECTS
FIRED FROM THE STANDING POSITION. FURTHER, IT WAS
EVIDENT THAT THE SHOOTER'S PERFORMANCE DURING TWO-
SECOND PRESENTATIONS DIFFERED SIGNIFICANTLY FROM
PERFORMANCE DURING FOUR AND SIX-SECOND EXPOSURES.
IT WAS CONCLUDED THAT BODY ARMOR ALONE DOES NOT
AFFECT RIFLE-FIRING BEHAVIOR FOR EITHER ACCURACY OR
FIRING TIME, THAT SUBSEQUENT INVESTIGATIONS NEED NOT
INCLUDE FOUR OR SIX SECOND PRESENTATION TIMES, AND
THAT FURTHER RESEARCH ON RIFLE-FIRING BEHAVIOR SHOULD
EXPLORE COMPLETE EQUIPMENT ENSEMBLES, INCLUDING LOAD-
CARRYING SEAS. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-753 73/ 1974 5/5
ARMY NATICK LABS MASS

SOME EFFECTS OF BODY ARMOR ON MOTOR
PERFORMANCE. PART I. EFFECTS OF STANDARD
(135 PLATE) AND EXPERIMENTAL (48 PLATE)
TITANIUM-NYLON BODY ARMOR ON MOTOR
PERFORMANCE. PART II. ARMOR AND LOAD
INDUCED PATTERNS OF PRESSURE ON THE TORSO
DURING MOTOR PERFORMANCE.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,

OCT 72 51P MCGINNIS, JOHN M. ;
REPT. NO. USA-NLABS-TR-73-13-PR
PROJ: DA-1-J-664713-DL-40, DA-1-T-062106-A-121
TASK: 1-J-664713-DL-4043, 1-T-062106-A-12102

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, PERFORMANCE(HUMAN)), HUMAN
FACTORS ENGINEERING, TITANIUM, NYLON, TEXTILES,
PRESSURE, DETECTORS, ANALYSIS OF VARIANCE, PHYSIOLOGY(U)
IDENTIFIERS: COMFORT (U)

NINE PSYCHOMOTOR TASKS DESIGNED FOR LABORATORY USE
MEASURED THE PERFORMANCE OF 18 SOLDIER TEST SUBJECTS
WHILE WEARING M1956 LIGHTWEIGHT LOAD CARRYING
EQUIPMENT (LCE) ALONE AND OVER STANDARD (135
PLATE) AND EXPERIMENTAL (48 PLATE) TITANIUM-
NYLON BODY ARMOR. SCORES BASED ON LCE ONLY, ON
EXPERIMENTAL ARMOR AND LCE, AND ON STANDARD ARMOR
PLUS LCE ARE COMPARED. IN LABORATORY INTERVIEWS,
SUBJECTS APPEARED TO PREFER LOAD CARRYING EQUIPMENT
WORN WITHOUT ARMOR TO LCE WORN OVER EITHER TYPE OF
ARMOR, AND THEY COMMENTED ON SPECIFIC ARMOR PROBLEMS.
NEXT, A LIGHTWEIGHT CLOTH SENSOR GARMENT
INCORPORATING PRESSURE SENSORS WAS USED TO MEASURE
PRESSURE AT VARIOUS LOCATIONS ON A TEST SUBJECT'S
TORSO AS HE PERFORMED TASK. PERFORMANCE AND DISPLAY
WERE RECORDED IN COLOR ON THE SAME MOTION PICTURE
FILM, FOR EACH OF SIX ARMOR-LOAD COMBINATIONS.
(AUTHOR)

(U)

UNCLASSIFIED

/ZAA14

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-756 367 1974
ARMY NATICK LABS MASS CLOTHING AND PERSONAL LIFE SUPPORT
EQUIPMENT LAB

BALLISTIC AND SPALL TESTS FOR AIRCREW BODY
ARMOR.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
AUG 72 74P JUDGE, THOMAS H. ; BUTTKUS,
PAUL J. ;
REPT. NO. C/PULSE-98
PROJ: DA-1-F-164207-DC-52
MONITOR: USA-VLABS TR-73-9-CE

UNCLASSIFIED REPORT

DESCRIPTORS: (*BODY ARMOR, *TERMINAL BALLISTICS),
(*FLIGHT CREWS, BODY ARMOR), FRAGMENTATION, PROTECTION,
PROJECTILES, TEXTILES, DESIGN, NYLON (U)
IDENTIFIERS: *SPALLING (U)

A NEW INTEGRATED BODY ARMOR CARRIER SYSTEM IS
DESIGNED TO REDUCE SPALL WHEN THE ARMOR PLATE IS
IMPACTED BY .30 CALIBER SMALL ARMS FIRE. BALLISTIC
TESTS, WHEN COMPARED TO PREVIOUS DATA, SHOWED THIS
SYSTEM EXHIBITED GREATER SPALL SUPPRESSION THAN THE
STANDARD AIRCREW ARMOR IN USE IN VIETNAM. THE
SYSTEM ALSO PROVIDES SECONDARY FRAGMENTATION
PROTECTION TO AREAS OF THE TORSO NOT COVERED BY THE
PLATE INSERT. RESULTS INDICATE THAT THE NEW VEST-
CARRIER SYSTEM MADE OF NYLON 128 SHOULD BE TYPE
CLASSIFIED AS STANDARD 'A'. INJURY BY FLYING
SPALL HAS BEEN REDUCED, BUT A CONTINUING PROGRAM IS
NEEDED TO ESTABLISH ADVANCED DESIGN CRITERIA, TEXTILE
AND OTHER MATERIAL CAPABILITIES TO SUPPRESS ALL
SPALL, GENERATED FROM OBLIQUITY STRIKES ON AIRCREW
ARMOR BY .30 CALIBER AP PROJECTILES.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-758 916 14/2 6/14 19/4
IIT RESEARCH INST CHICAGO ILL

DESIGN AND DEVELOPMENT OF A FULL-SCALE
ANATOMICAL LOAD DISTRIBUTION ANALYZER.

(U)

DESCRIPTIVE NOTE: FINAL REPT. MAY 70-FEB 72,
NOV 72 60P RODZEN,R. ;OGDEN,C. ;
SCRIBANG,F. ;BURNS,M. ;BARRON,E. R. ;
CONTRACT: JAAG17-70-C-0161
PROJ: DA-1-F-164204-D-154
MONITOR: C/PSEL,USA-NLABS 99,TR-73-18-CE

UNCLASSIFIED REPORT

DESCRIPTORS: (•TEST EQUIPMENT, DESIGN); (•ANTHROPOMETRY,
•BODY ARMOR), ARMY RESEARCH, MEASUREMENT, HUMAN BODY,
LOADS(FORCES), PRESSURE, DETECTORS, PRESSURE GAGES (U)

IN A CONTINUING EFFORT TO REDUCE DISCOMFORT IN THE
WEARING OF CERAMIC BODY ARMOR, THE MEASUREMENT OF
STRESSES UPON THE BODY HAS BEEN AN IMPORTANT APPROACH
TOWARD ACHIEVING THE BEST POSSIBLE CONFIGURATION FOR
RIGID PLATES. A DEVICE FOR MAKING SUCH
MEASUREMENTS HAS BEEN DEVELOPED WHICH IS CAPABLE OF
SIMULTANEOUSLY MEASURING AND DISPLAYING PRESSURE,
PRESSURE CHANGES, LOAD MAGNITUDE AND THE DISTRIBUTION
OF FORCES TRANSMITTED TO THE TORSO BY AIRCREW AND
INFANTRY ARMOR, LOAD CARRYING EQUIPMENT, COMBAT
CLOTHING, SEAT CONFIGURATIONS AND SEAT RESTRAINT AND
PARACHUTE HARNESSES. THE SYSTEM CONSISTS OF A
SENSOR VEST INCORPORATING 248 MINIATURE SENSORS. A
THREE-DIMENSIONAL ANATOMICAL UNIT VISUALLY DISPLAYS
LOAD MAGNITUDES AND DISTRIBUTION OF FORCES
TRANSMITTED TO THE TORSO BY LIGHTS WHICH CHANGE COLOR
DEPENDING UPON THE LOAD. (AUTHOR MODIFIED
ABSTRACT)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-759 493 1974 5/5
HUMAN ENGINEERING LAB ABERDEEN PROVING GROUND MD

HUMAN FACTOR EVALUATION OF THE USMC M1955
ARMORED VEST AND THE PROPOSED TITANIUM
NYLON IMPROVED CONVENTIONAL MUNITIONS
PROTECTIVE ARMORED VEST (48 PLATE). (U)

DESCRIPTIVE NOTE: TECHNICAL MEMO.,
MAR 73 77D SCHEETZ, HAYDEN A. ; CORONA,
BERNARD M. ; TELLIS, PAUL H. ; JONES, R. DOUGLAS
; RANDALL, R. ; BRADLEY ;
REPT. NO. HEL-TM-8-73

UNCLASSIFIED REPORT

DESCRIPTORS: (*BODY ARMOR, *HUMAN FACTORS ENGINEERING),
TITANIUM, ANTHROPOMETRY, NYLON, PERFORMANCE(HUMAN),
ADAPTATION(PHYSIOLOGY), FIRING TESTS(ORDNANCE),
PERFORMANCE(HUMAN), ARMY EQUIPMENT (U)

A HUMAN FACTORS EVALUATION OF THE ARMY
SIMPLIFIED 48-PLATE TITANIUM/NYLON ARMORED
VEST AND THE M1955 USMC DORON ARMORED
VEST WAS CONDUCTED BY THE U.S. ARMY HUMAN
ENGINEERING LABORATORY. THE VESTS WERE
COMPARED AS TO PHYSICAL CHARACTERISTICS,
ANTHROPOMETRIC MEASUREMENTS, VEST MOVEMENT AND STATIC
EXERCISE, EMPLOYMENT OF SMALL ARMS BY TROOPS EQUIPPED
WITH THE VESTS, AND USER ACCEPTANCE. THE RESULTS
YIELDED MANY POINTS OF CONTRAST BETWEEN VESTS, BUT NO
OVERRIDING SUPERIORITY OF EITHER VEST WAS NOTED.
RECOMMENDATIONS ARE MADE TO IMPROVE THE QUALITIES
OF THE SIMPLIFIED 48-PLATE TITANIUM/NYLON
CONFIGURATION, BASED ON THE CONCLUSION THAT A GREATER
POTENTIAL FOR FURTHER DEVELOPMENT IS SEEN IN THE
ARTICULATED CONFIGURATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-763 165 1974

EDGEMOND ARSENAL ABERDEEN PROVING GROUND MD

A SYSTEMS EFFECT STUDY ON THE EVALUATION OF
LIGHTWEIGHT BODY ARMOR.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT. DEC 72-SEP 72,
JUN 73 34P SACCO, WILLIAM J. ISHEAR,
RALPH E. ;

REPT. NO. EA-TR-4729

PROJ: DA-1-J-662713-DJ-4U, DA-1-T-062110-A-027

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, RELIABILITY), EFFECTIVENESS,
PROTECTION, FRAGMENTATION, PENETRATION, TERMINAL
BALLISTICS, NONLINEAR PROGRAMMING, THORAX (U)
IDENTIFIERS: EVALUATION (U)

CONTENTS: FRAGMENT THREATS; THE FRAGMENT
SIMULATOR; THE THORACIC DEFENSE SYSTEM; MEDICAL
EVALUATION PHASE. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-765 423 11/8 1974
ALLIED CHEMICAL CORP PETERSBURG VA

EXPERIMENTAL NYLON 6 FOR PERSONNEL
ARMOR.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,
DEC 72 41P MAYER, RICHARD E. ;
CONTRACT: DAAG17-70-C-0029
PROJ: DA-1-T-062105-A-329
TASK: 1-T-062105-A-329C2
MONITOR: USA-NLADS TR-73-28-CE

UNCLASSIFIED REPORT

DESCRIPTORS: (•BODY ARMOR, •NYLON), TERMINAL BALLISTICS,
TEXTILES, TESTS, SPINNING (INDUSTRIAL PROCESSES),
PRODUCTION (U)
IDENTIFIERS: NYLON 6 (U)

THE WORK WAS AN EFFORT TO DETERMINE WHETHER THE
PERFORMANCE OF THE NEW TYPE NYLON 6 FOR PERSONNEL
ARMOR COULD BE FURTHER OPTIMIZED BY VARIATIONS IN
MOLECULAR WEIGHT, MOLECULAR WEIGHT DISTRIBUTION,
ORIENTATION AND CRYSTALLINITY. THE RESULTS
ALTHOUGH NEGATIVE IN RESPECT TO THE GOAL OF WEIGHT,
NEVERTHELESS SHOW THAT AN INVESTIGATION OF
FUNDAMENTALLY DIFFERENT TYPES OF FIBER IS NEEDED TO
OBTAIN SIGNIFICANT IMPROVEMENTS IN TENACITY, WORK-TO-
RUPTURE, AND ATTENDANT INCREASES IN IMPACT
RESISTANCE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-766 296 1974
HUMAN ENGINEERING LAB ABERDEEN PROVING GROUND MD

A HUMAN FACTORS ENGINEERING ASSESSMENT OF
AN ANATOMICALLY CONFORMING AIRCREW BODY
ARMOR SYSTEM.

(U)

DESCRIPTIVE NOTE: TECHNICAL MEMO.,
JUN 73 90P CORONA, BERNARD M. JONES,
R. DOUGLAS ;
REPT. NO. HEL-TM-9-73

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, FLIGHT CREWS), COMPATIBILITY,
ARMY RESEARCH (U)

AN ANATOMICALLY CONFORMING, FOUR-SIZE, AIRCREW BODY
ARMOR (ACBA) SYSTEM, DEVELOPED BY US ARMY
NATICK LABORATORIES, WAS ASSESSED TO DETERMINE
ITS COMPATIBILITY WITH ARMY AVIATOR BODY SIZES,
FLIGHT TASK REQUIREMENTS AND AIRCREW STATION
GEOMETRY. AS A BASE FOR ALL COMPARISONS THE
STANDARD THREE-SIZE, AIRCREW BODY ARMOR (SBA)
SYSTEM WAS USED. WHERE POSSIBLE AN ATTEMPT WAS
MADE TO INTEGRATE AND UTILIZE ELEMENTS OF THE HEL
ARMOR SYSTEM DEVELOPMENT/EVALUATION
GUIDELINE, TM 18-69. THIRTY ENLISTED MEN AND
SIX OFFICER PILOTS WERE USED AS SUBJECTS. AS A
RESULT OF THIS HFE ASSESSMENT IT HAS BEEN
DETERMINED THAT THE ACBA SYSTEM WAS NOT SUITABLE AS
PROPOSED, THE SBA SYSTEM HAS SERIOUS SHORTCOMINGS,
AND THE HEL TM 18-69 CANNOT BE UTILIZED FOR THE
DEVELOPMENT OR EVALUATION OF BODY-WORN ARMOR SYSTEMS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-815 561 1974
ARMY CONCEPT TEAM IN VIETNAM SAN FRANCISCO CALIF
96243

BODY ARMOR.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 15 JAN-30 MAY 67,
JUN 67 7P SPICELY, SAMUEL B. :
PROJ: ACTIV-ACL-24/67:

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, ACCEPTABILITY), INFANTRY,
CONFIGURATION, TEST EQUIPMENT, HUMAN FACTORS
ENGINEERING, WEIGHT, PERFORMANCE (ENGINEERING),
VIETNAM
IDENTIFIERS: COMFORT

(U)

(U)

TROOP ACCEPTANCE DURABILITY, AND OPERATIONAL
SUITABILITY OF ARMOR, INFANTRY SMALL ARMS,
PROTECTIVE FRONT AND BACK WITH CARRIER, AND
BODY ARMOR, FRAGMENTATION PROTECTIVE,
LIGHTWEIGHT WERE DETERMINED IN VIETNAM. BODY
ARMOR, FRAGMENTATION PROTECTIVE, LIGHTWEIGHT
IS DURABLE BUT IS NOT ACCEPTABLE FOR WEAR BY FOOT
MOBILE TROOPS WHILE ENGAGED IN SEARCH AND DESTROY
OPERATIONS, PATROLLING, OR RECONNAISSANCE OPERATIONS.
ARMOR, INFANTRY SMALL ARMS, PROTECTIVE
FRONT AND BACK WITH CARRIER IS DURABLE AND
ACCEPTABLE FOR USE BY PERSONNEL ENGAGED IN CONVOY
ESCORT DUTY, MOTORIZED PATROLS, AND SIMILAR
FUNCTIONS. CONTINUED R AND D EMPHASIS SHOULD
BE PLACED ON REDUCING THE WEIGHT OF BODY ARMOR.
ARMOR INFANTRY SMALL ARMS, PROTECTIVE
FRONT AND BACK WITH CARRIER, SHOULD BE MADE
AVAILABLE FOR ISSUE TO TROOPS ENGAGED IN CONVOY
ESCORT DUTY, MOTORIZED PATROLS, AND SIMILAR
FUNCTIONS. (AUTHOR)

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-618 141 1974
ARMY INFANTRY BOARD FORT BENNING GA

SERVICE TEST OF LIGHTWEIGHT BODY ARMOR, BASIC VEST,
T66-1. (U)

DESCRIPTIVE NOTE: FINAL TEST REPT. 6 JAN-6 MAY 67,
JUN 67 63P DRYANT, JAMES A. ;
REPT. NO. USAIB-3174
PROJ: RDT/E-1B643303D54730, USATECOM-6-7-6510-02

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, ACCEPTABILITY), HUMAN FACTORS
ENGINEERING, PROTECTION, CLOTHING, ARMY PERSONNEL,
QUALITY CONTROL, FAILURE, TEST METHODS, MOISTURE (U)
IDENTIFIERS: HUMAN FACTORS ENGINEERING,
LINCLOE LIGHTWEIGHT INDIVIDUAL COMBAT CLOTHING AND E,
PARACHUTISTS (U)

THE SERVICE TEST OF LIGHTWEIGHT BODY
ARMOR, BASIC VEST, T66-1, WAS CONDUCTED BY
THE US ARMY INFANTRY BOARD FROM 6 JANUARY
1967 TO 6 MAY 1967. THE PURPOSE OF THE TEST WAS
TO DETERMINE THE SUITABILITY OF THE T66-1 VEST FOR
US ARMY USE; TO DETERMINE TO WHAT EXTENT THE
T66-1 VEST MET THE REQUIREMENTS OF THE LINCLOE
QMR; AND TO DETERMINE THE SUITABILITY OF THE T66-
1 VEST FOR PARACHUTIST'S USE AND USE WITH LOWERING
DEVICES. FOUR DEFICIENCIES AND THREE SHORTCOMINGS
WERE FOUND. THE DEFICIENCIES WERE: LACK OF
DURABILITY OF THE T66-1 VEST, ALL SIZES OF THE
T66-1 VEST EXCEED THE WEIGHT LIMITATIONS SPECIFIED
IN LINCLOE QMR; THE T66-1 VEST RESTRICTED HEAD
AND BODY MOVEMENT AND BREATHING TO A GREATER DEGREE
THAN THE STANDARD VEST AND CONSEQUENTLY FAILED TO
IMPROVE, OVER THE STANDARD VEST, THE WEARER'S ABILITY
TO PERFORM A COMBAT RELATED ACTIVITY; THE T66-1
VEST PREVENTED PARACHUTISTS FROM CHECKING THEIR
ENTIRE CANOPIES FOR MALFUNCTION OR DAMAGE, THUS
CREATING A SAFETY HAZARD TO PARACHUTISTS. THE
SHORTCOMINGS WERE: THE INADEQUACY OF THE AND
GRENADES; INADEQUACY OF THE CLOSURE SYSTEM ON THE
BELLows-TYPE BREAST POCKETS FOR KEEPING THE POCKETS
CLOSED; AND OMISSION OF INSTRUCTIONS IN THE PQM
FOR WASHING THE T66-1 VEST. THE US ARMY
INFANTRY BOARD CONCLUDES THAT THE T66-1 VEST IS
UNSUITABLE FOR US ARMY USE UNTIL CORRECTION OF THE
DEFICIENCIES AND AS MANY SHORTCOMINGS AS PRACTICABLE.

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/ZAA14

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-826 999 5/9 6/17 19/4
ARMY CONCEPT TEAM IN VIETNAM SAN FRANCISCO CALIF 96384

AIRCREW PROTECTIVE ARMOR. (U)

DESCRIPTIVE NOTE: FINAL REPT. OCT-DEC 67,
JAN 68 13P YOST, DEVERNE R. ;
PROJ: ACTIV-ACA-55/67-1

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, FLIGHT CREWS), MILITARY
EQUIPMENTS, EFFECTIVENESS, PROTECTIVE CLOTHING,
CERAMIC MATERIALS, GLASS TEXTILES, DESIGN, NYLON (U)

THE PRESENT AIRCREW ARMOR WILL NOT CONTAIN THE
BULLET SPLASH NOR THE SPALL WHEN STRUCK BY A
PROJECTILE. NATICK LABORATORY DESIGNED AND
FABRICATED A NYLON FELT FILLED VEST TO CARRY THE
CERAMIC, FIBER GLASS PLATES. NATICK LABORATORY
TESTS CONFIRMED THE CREDIBILITY OF DESIGN. THE
ARMY CONCEPT TEAM IN VIETNAM (ACTIV)
EVALUATED THE ITEMS TO DETERMINE IF THE EQUIPMENT WAS
COMFORTABLE AND WOULD NOT INTERFERE WITH PERFORMANCE
OF CREW DUTIES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-828 484 1974 11/9
ARMY GENERAL EQUIPMENT TEST ACTIVITY FORT LEE VA

ENGINEERING TEST OF LIGHTWEIGHT BODY ARMOR, BASIC
VEST, T66-1. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
AUG 67 95P MANGUM, EDWIN W. I
PROJ: RDT/E-1-M-643303-D-547, USATECOM-876510
TASK: 1-M-643303-D-54730, 87651001

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, ACCEPTABILITY), SAFETY, HUMAN
FACTORS ENGINEERING, FLAMMABILITY, QUESTIONNAIRES,
NYLON, VISUAL INSPECTION, VENTILATION, BURNING RATE,
WEAR RESISTANCE, ENVIRONMENTAL TESTS, RELIABILITY (U)
IDENTIFIERS: HEAT, PROTECTION (U)

AN ENGINEERING TEST OF LIGHTWEIGHT BODY
ARMOR, BASIC VEST, T66-1 WAS CONDUCTED FROM 9
JANUARY THROUGH 30 JUNE 1967 TO DETERMINE THE
TECHNICAL PERFORMANCE AND SAFETY CHARACTERISTICS OF
THE T66-1 VEST IN CONSIDERATION OF ALL TECHNICAL
CHARACTERISTICS FOR LIGHTWEIGHT BODY ARMOR IN
THE QMR FOR A SYSTEM OF LIGHTWEIGHT INDIVIDUAL
CLOTHING AND EQUIPMENT (LINCOE) WITH THE
EXCEPTION OF THOSE RELATED TO BALLISTICS LIMITS,
MAINTENANCE, AND TRAINING DEVICES. IT IS
RECOMMENDED THAT THE LIGHTWEIGHT BODY ARMOR,
BASIC VEST, T66-1 BE MODIFIED TO INCLUDE A
NONFLAMMABLE BINDER IN THE NYLON FELT FILLER, TO
PROVIDE INCREASED VENTILATION, AND TO ELIMINATE
INTERFERENCE WITH POSITIONING AND FIRING THE RIFLE. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-867 357 1974 6/17
ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND
MD

ARCTIC ENVIRONMENTAL TEST OF BODY ARMOR AND
HELMETS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. ON MATERIEL TEST PROCEDURE.

NOV 69 16P

REPT. NO. MTP-10-4-009

PROJ: AMCR-310-6

UNCLASSIFIED REPORT

DESCRIPTORS: (•HELMETS, COLD WEATHER TESTS), (•BODY
ARMOR, COLD WEATHER TESTS), SAFETY, HUMAN FACTORS
ENGINEERING, DROP TESTS, MAINTAINABILITY, PHYSICAL
PROPERTIES, ARMY RESEARCH, ARCTIC REGIONS

(U)

THE REPORT DESCRIBES TEST METHODS AND TECHNIQUES
FOR EVALUATING THE PERFORMANCE AND CHARACTERISTICS OF
BODY ARMOR AND HELMETS UNDER ARCTIC WINTER
ENVIRONMENTAL CONDITIONS, RELATIVE TO THE
REQUIREMENTS EXPRESSED IN QUALITATIVE MATERIEL
REQUIREMENTS, SMALL DEVELOPMENT REQUIREMENTS,
OR OTHER APPLICABLE DOCUMENTATION CONTAINING DESIGN
REQUIREMENTS. THE END OBJECTIVE OF TESTING IS TO
ASCERTAIN WHETHER THE TEST ITEM IS SUITABLE FOR
MILITARY SERVICE USE UNDER ARCTIC WINTER
ENVIRONMENTAL CONDITIONS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-872 651 1974 14/2
ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND
MD

BODY ARMOR.

(U)

DESCRIPTIVE NOTE: FINAL REPT. ON MATERIEL TEST PROCEDURE.

JUN 70 24P

REPT. NO. MTP-10-2-206

PROJ: AMCR-310-6

UNCLASSIFIED REPORT

DESCRIPTORS: (*BODY ARMOR; TEST METHODS), ARMY
EQUIPMENT, STANDARDS, TEST EQUIPMENT, RELIABILITY,
ENVIRONMENTAL TESTS, TRANSPORTATION, MAINTENANCE, LIFE
EXPECTANCY, SAFETY, HUMAN FACTORS ENGINEERING, QUALITY
CONTROL (U)

IDENTIFIERS: *COMMON ENGINEERING TEST PROCEDURES,
EVALUATION, LIGHTWEIGHT INDIVIDUAL CLOTHING AND
EQUIPMENT, LINCLOE(LIGHTWEIGHT INDIVIDUAL CLOTHING AND
EQUIPMEN (U)

THE ENGINEERING TEST PROCEDURE DESCRIBES TEST
METHODS AND TECHNIQUES FOR EVALUATING THE TECHNICAL
PERFORMANCE AND CHARACTERISTICS OF BODY ARMOR, AND
FOR DETERMINING ITS SUITABILITY TO BE SUBJECTED TO
FURTHER TEST FOR SERVICE USE BY THE U. S. ARMY.
THE EVALUATION IS RELATED TO CRITERIA EXPRESSED IN
APPLICABLE QUALITATIVE MATERIEL REQUIREMENTS (QMR),
SMALL DEVELOPMENT REQUIREMENTS (SDR), TECHNICAL
CHARACTERISTICS (TC), OR OTHER APPROPRIATE DESIGN
REQUIREMENTS AND SPECIFICATIONS. (U)

UNCLASSIFIED

CORPORATE AUTHOR - MONITORING AGENCY

*ADVISORY GROUP FOR AEROSPACE RESEARCH
AND DEVELOPMENT PARIS (FRANCE)

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AGARD-CP-41
PATTERN RECOGNITION. BODY
ARMOUR AND AIRCREW EQUIPMENT
ASSEMBLIES. CURRENT SPACE MEDICAL
PROBLEMS. AEROMEDICAL EVACUATION.
AD-691 092

*AEROJET-GENERAL CORP AZUSA CALIF

* * *

DEVELOPMENT OF PLASTIC MATERIAL
FOR PERSONNEL ARMOR
AD-052 243

* * *

DEVELOPMENT OF PLASTIC MATERIAL
FOR PERSONNEL ARMOR
AD-069 734

*ALLIED CHEMICAL CORP PETERSBURG VA

* * *

EXPERIMENTAL NYLON 6 FOR
PERSONNEL ARMOR.
(USA-NLABS-TR-73-28-CE)
AD-765 423

*ARMY CONCEPT TEAM IN VIETNAM SAN
FRANCISCO CALIF 96243

* * *

BODY ARMOR.
AD-815 561

*ARMY CONCEPT TEAM IN VIETNAM SAN
FRANCISCO CALIF 96384

* * *

AIRCREW PROTECTIVE ARMOR.
AD-826 999

*ARMY FOREIGN SCIENCE AND TECHNOLOGY
CENTER CHARLOTTESVILLE VA

* * *

FSTC-HT-23-1651-70
KNIGHTS OF THE TWENTIETH
CENTURY (RYTSALI DVADTSATEGO VEKA),
AD-719 551

*ARMY GENERAL EQUIPMENT TEST ACTIVITY
FORT LEE VA

* * *

ENGINEERING TEST OF LIGHTWEIGHT

BODY ARMOR, BASIC VEST, T66-1.
AD-828 884

*ARMY INFANTRY BOARD FORT BENNING GA

* * *

USAIB-3174
SERVICE TEST OF LIGHTWEIGHT
BODY ARMOR, BASIC VEST, T66-1.
AD-818 141

*ARMY NATICK LABS MASS

* * *

USA-NLABS-72-3-CE
FOAM FLOTATION SYSTEMS FOR
PERSONNEL WEARING BODY ARMOR.
AD-731 000

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USA-NLABS-TR-68-4-PR
HUMAN FACTORS EVALUATION OF
BODY-SUPPORTED AIRCREWMAN'S
BUTTOCKS AND CROTCH PROTECTIVE
UNITS: (COMPARISONS OF TWO HEIGHTS
OF CROTCH PROTECTOR AND THREE
SUSPENSION SYSTEMS).
AD-658 034

* * *

USA-NLABS-TR-68-57-CM
CRASHWORTHINESS OF AIRCREW
PROTECTIVE ARMOR.
AD-672 504

* * *

USA-NLABS-TR-69-43-CE
BODY ARMOR FOR AIRCREWMEN.
AD-688 122

* * *

USA-NLABS-TR-69-49-CE
A STUDY OF FORCES CAUSED BY
HEAD IMPACT ON AIRCREW PERSONNEL
ARMOR UNDER SIMULATED CRASH
CONDITIONS.
AD-685 838

* * *

USA-NLABS-TR-69-61-CE
CONSTRUCTION OF BALLISTIC
MATERIAL SAMPLES FOR AIRCREW ARMOR
SYSTEMS.
AD-691 739

* * *

USA-NLABS-TR-69-79-PR
EVALUATION OF ARMY AIRCREW
PROTECTIVE ARMOR IN VIETNAM.

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UNCLASSIFIED

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ARM-ARM

AD-696 481

USA-NLABS-TR-70-13-CE
A STUDY OF FELTS FOR PERSONAL
ARMOR.

AD-695 644

USA-NLABS-TR-70-32-CE
A REVIEW OF THE DEVELOPMENT OF
BALLISTIC NEEDLE-PUNCHED FELTS.
AD-777 918

USA-NLABS-TR-70-51-CE
ADVANCED AIRCREW ARMOR
SUSPENSION SYSTEMS.
AD-713 016

USA-NLABS-TR-70-65-CE
DESIGN, DEVELOPMENT AND
FABRICATION OF A PERSONNEL ARMOR
LOAD PROFILE ANALYZER.
AD-711 876

USA-NLABS-TR-71-30-CE
A HISTORY OF THE DEVELOPMENT OF
AN ARMOR ENSEMBLE FOR MINE
CLEARANCE PERSONNEL.
AD-729 353

USA-NLABS-TR-71-47-CE
EXPERIMENTAL ORGANIC FIBER
MATERIALS FOR PERSONNEL ARMOR.
AD-730 775

USA-NLABS-TR-71-48-CE
BICOMPONENT AND BICONSTITUENT
FIBERS IN BALLISTIC FABRIC FOR
PERSONNEL ARMOR.
AD-726 918

USA-NLABS-TR-73-9-CE
BALLISTIC AND SPALL TESTS FOR
AIRCREW BODY ARMOR.
AD-756 367

USA-NLABS-TR-73-13-PR
SOME EFFECTS OF BODY ARMOR ON
MOTOR PERFORMANCE. PART I.
EFFECTS OF STANDARD (135 PLATE) AND
EXPERIMENTAL (48 PLATE) TITANIUM-
NYLON BODY ARMOR ON MOTOR

PERFORMANCE. PART II. ARMOR AND
LOAD INDUCED PATTERNS OF PRESSURE
ON THE TORSO DURING MOTOR
PERFORMANCE.

AD-753 937

USA-NLABS-TR-73-18-CE
DESIGN AND DEVELOPMENT OF A
FULL-SCALE ANATOMICAL LOAD
DISTRIBUTION ANALYZER.
AD-758 918

USA-NLABS-TR-73-28-CE
EXPERIMENTAL NYLON 6 FOR
PERSONNEL ARMOR.
AD-765 423

*ARMY NATICK LABS MASS PIONEERING
RESEARCH DIV

EPR-14
HUMAN FACTORS EVALUATION OF
BODY-SUPPORTED AIRCREWMAN'S
BUTTOCKS AND CROTCH PROTECTIVE
UNITS: (COMPARISONS OF TWO HEIGHTS
OF CROTCH PROTECTOR AND THREE
SUSPENSION SYSTEMS).
(USA-NLABS-TR-68-4-PR)
AD-658 034

*ARMY NATICK LABS MASS CLOTHING AND
ORGANIC MATERIALS LAB

C/OM-47
CRASHWORTHINESS OF AIRCREW
PROTECTIVE ARMOR.
AD-672 504

*ARMY NATICK LABS MASS CLOTHING AND
PERSONAL LIFE SUPPORT EQUIPMENT LAB

C/ED-50
BODY ARMOR FOR AIRCREWMEN.
(USA-NLABS-TR-69-43-CE)
AD-688 122

C/PLSEL-59
A STUDY OF FORCES CAUSED BY
HEAD IMPACT ON AIRCREW PERSONNEL
ARMOR UNDER SIMULATED CRASH
CONDITIONS.

0-2

UNCLASSIFIED

/ZAA14

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ARM-AV1

AD-685 838

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C/PLSEL-62
CONSTRUCTION OF BALLISTIC
MATERIAL SAMPLES FOR AIRCREW ARMOR
SYSTEMS.
AD-691 739

* * *

C/PLSEL-74
ADVANCED AIRCREW ARMOR
SUSPENSION SYSTEMS.
AD-713 016

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C/PLSEL-75
DESIGN, DEVELOPMENT AND
FABRICATION OF A PERSONNEL ARMOR
LOAD PROFILE ANALYZER.
AD-711 876

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C/PLSEL-84
A HISTORY OF THE DEVELOPMENT OF
AN ARMOR ENSEMBLE FOR MINE
CLEARANCE PERSONNEL.
(USA-NLABS-TR-71-30-CE)
AD-729 353

* * *

C/PLSEL-87
FOAM FLOTATION SYSTEMS FOR
PERSONNEL WEARING BODY ARMOR.
AD-731 000

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C/PLSEL-98
BALLISTIC AND SPALL TESTS FOR
AIRCREW BODY ARMOR.
(USA-NLABS-TR-73-9-CE)
AD-756 367

* * *

C/PLSEL-TS-164
A STUDY OF FELTS FOR PERSONAL
ARMOR.
AD-695 644

* * *

C/PLSEL-TS-173
BICOMPONENT AND BICONSTITUENT
FIBERS IN BALLISTIC FABRIC FOR
PERSONNEL ARMOR.
AD-726 918

* * *

C/PLSEL-TS-177
EXPERIMENTAL ORGANIC FIBER
MATERIALS FOR PERSONNEL ARMOR.

AD-730 775

* * *

C/PLSEL-TS-167
A REVIEW OF THE DEVELOPMENT OF
BALLISTIC NEEDLE-PUNCHED FELTS.
(USA-NLABS-TR-70-32-CE)
AD-707 918

*ARMY NATICK LABS MASS PIONEERING
RESEARCH LAB

* * *

EPT-9
EVALUATION OF ARMY AIRCREW
PROTECTIVE ARMOR IN VIETNAM.
(USA-NLABS-TR-69-79-PR)
AD-696 481

*ARMY TEST AND EVALUATION COMMAND
ABERDEEN PROVING GROUND MD

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MTP-10-2-206
BODY ARMOR.
AD-872 651

* * *

MTP-10-2-506
BALLISTIC TESTING OF PERSONNEL
ARMOR MATERIALS.
AD-719 212

* * *

MTP-10-4-009
ARCTIC ENVIRONMENTAL TEST OF
BODY ARMOR AND HELMETS.
AD-867 357

* * *

TOP-10-3-022
BODY ARMOR.
AD-751 155

*AVIATION (M L) CO LTD (GT BRIT)

* * *

PHYSIOLOGICAL COSTS OF BODY
ARMOR.
AD-687 953

*AVIATION SAFETY ENGINEERING AND
RESEARCH PHOENIX ARIZ

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CRASHWORTHINESS OF AIRCREW
PROTECTIVE ARMOR.
(USA-NLABS-TR-68-57-CM)
AD-672 504

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BEL-MAP

UNCLASSIFIED

*CHEMICAL CORPS MEDICAL LABS ARMY
CHEMICAL CENTER MD

RR257
WOUND BALLISTICS, WOUNDED IN
ACTION, KOREA, 6 AUGUST 1953-19
AUGUST 1953
AD-029 480

RR300
A COMPARATIVE BALLISTIC STUDY
OF THE STANDARD U.S. ARMY VEST.
M1952-A, AND OF THE CANADIAN ARMOR
VEST, X53
AD-039 470

*DYNAMIC SCIENCE PHOENIX ARIZ AVSER
FACILITY

A STUDY OF FORCES CAUSED BY
HEAD IMPACT ON AIRCREW PERSONNEL
ARMOR UNDER SIMULATED CRASH
CONDITIONS.
(USA-NLABS-TR-69-49-CE)
AD-685 838

*EDGEWOOD ARSENAL ABERDEEN PROVING
GROUND MD

EA-TR-4729
A SYSTEMS EFFECT STUDY ON THE
EVALUATION OF LIGHTWEIGHT BODY
ARMOR.
AD-763 165

*HUMAN ENGINEERING LAB ABERDEEN
PROVING GROUND MD

HEL-TM-8-73
HUMAN FACTOR EVALUATION OF THE
USMC M1955 ARMORED VEST AND THE
PROPOSED TITANIUM NYLON IMPROVED
CONVENTIONAL MUNITIONS PROTECTIVE
ARMORED VEST (46 PLATE).

AD-759 493

HEL-TM-9-73
A HUMAN FACTORS ENGINEERING
ASSESSMENT OF AN ANATOMICALLY
CONFORMING AIRCREW BODY ARMOR
SYSTEM.
AD-766 296

HEL-TN-14-72
EVALUATION OF RIFLE-FIRING
BEHAVIOR OF TROOPS EQUIPPED WITH
BODY ARMOR: A PILOT STUDY.
AD-752 903

*IIT RESEARCH INST CHICAGO ILL

CONSTRUCTION OF BALLISTIC
MATERIAL SAMPLES FOR AIRCREW ARMOR
SYSTEMS.
(USA-NLABS-TR-69-61-CE)
AD-691 739

DESIGN, DEVELOPMENT AND
FABRICATION OF A PERSONNEL ARMOR
LOAD PROFILE ANALYZER.
(USA-NLABS-TR-70-65-CE)
AD-711 876

ADVANCED AIRCREW ARMOR
SUSPENSION SYSTEMS.
(USA-NLABS-TR-70-51-CE)
AD-713 016

DESIGN AND DEVELOPMENT OF A
FULL-SCALE ANATOMICAL LOAD
DISTRIBUTION ANALYZER.
AD-750 918

*MARINE CORPS LANDING FORCE
DEVELOPMENT CENTER QUANTICO VA

T 1041
BODY ARMOR
AD-037 068

T 1041 1
ARMORED VEST, MODIFIED, EX 53-
1. STUDY, EVALUATION AND FIELD TEST
OF
AD-035 448

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UNCLASSIFIED

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UNCLASSIFIED

MEL-GUA

*MELLON INST PITTSBURGH PA

BALLISTIC PROTECTIVE BUOYANT
MATERIALS
AD-259 057

BALLISTIC PROTECTIVE BUOYANT
MATERIALS
AD-266 054

BALLISTIC PROTECTIVE BUOYANT
MATERIALS
AD-269 577

BALLISTIC PROTECTIVE BUOYANT
MATERIALS
AD-276 256

*MONSANTO RESEARCH CORP DAYTON OHIO

FOAM FLOTATION SYSTEMS FOR
PERSONNEL WEARING BODY ARMOR.
(USA-NLABS-72-3-CE)
AD-731 000

*MONSANTO RESEARCH CORP DURHAM N C

EXPERIMENTAL ORGANIC FIBER
MATERIALS FOR PERSONNEL ARMOR.
(USA-NLABS-TR-71-47-CE)
AD-730 775

*NAVAL MEDICAL FIELD RESEARCH LAB CAMP
LEJEUNE N C

THE EFFECT OF SIMULATED
TROPICAL CLIMATE ON THE PERFORMANCE
OF MARINE CORPS PERSONNEL WEARING
AN INTEGRATED BODY ARMOR-LOAD
CARRYING SYSTEM (BALCS)
AD-258 296

THE EFFECTS OF TWO TYPES OF
BODY ARMOR ON BODY TEMPERATURE.
AD-624 738

BODY ARMOR IN A HOT HUMID
ENVIRONMENT. PART I. STUDIES IN
UNACCLIMATIZED MEN.
AD-676 689

BODY ARMOR IN A HOT HUMID
ENVIRONMENT. PART II. STUDIES IN
HEAT ACCLIMATIZED MEN.
AD-682 689

*NAVY CLOTHING AND TEXTILE RESEARCH
UNIT NATICK MASS

2-72

THE DEVELOPMENT OF A NAVY,
BUOYANT, ANTI-FRAGMENT, BULLETPROOF
VEST: PROTECTION AGAINST LOW-
VELOCITY FRAGMENTS, SECONDARY
(SPALL) FRAGMENT DAMAGE, AND 30-
CALIBER-BALL PROJECTILES.
AD-752 792

TR-105

THE DEVELOPMENT OF A NAVY,
BUOYANT, ANTI-FRAGMENT, BULLETPROOF
VEST: PROTECTION AGAINST LOW-
VELOCITY FRAGMENTS, SECONDARY
(SPALL) FRAGMENT DAMAGE, AND 30-
CALIBER-BALL PROJECTILES.
AD-752 792

*OFFICE OF THE DIRECTOR OF DEFENSE
RESEARCH AND ENGINEERING WASHINGTON
D C

SYMPOSIUM ON PERSONNEL ARMOR
HELD AT THE U. S. NAVAL RESEARCH
LABORATORY OCTOBER 4-5, 1961 VOLUME
I
AD-273 876

*QUARTERMASTER CORPS WASHINGTON D C

A SET OF ANGLES OF OBLIQUITY
FOR USE IN ASSESSING BODY ARMOR
AD-255 237

*QUARTERMASTER RESEARCH AND
ENGINEERING COMMAND NATICK MASS

PHYSIOLOGICAL RESPONSE CHANGES
OF MEN ATTRIBUTABLE TO BODY ARMOR,
SUN, AND WORK IN A NATURAL DESERT
ENVIRONMENT (INCLUDING NEGRO-WHITE
DIFFERENCES)
AD-262 076

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TEX-WAT

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EPB-208
ENERGY COST OF WEARING ARMORED
VESTS AND CARRYING PACK LOADS ON
TREADMILL, LEVEL COURSE, AND
MOUNTAIN SLOPES
AD-021 004

*TEXTILE RESEARCH INST PRINCETON N J
* * *
A STUDY OF FELTS FOR PERSONAL
ARMOR.
(USA-NLABS-TR-70-13-CE)
AD-695 644

*UNIROYAL INC WAYNE N J
* * *
BICOMPONENT AND BICONSTITUENT
FIBERS IN BALLISTIC FABRIC FOR
PERSONNEL ARMOR.
(USA-NLABS-TR-71-48-CE)
AD-726 918

*UNIVERSITY OF MANCHESTER INST OF
SCIENCE AND TECHNOLOGY (ENGLAND)
* * *
RESEARCH ON ENERGY ABSORPTION
BY NONWOVEN FABRICS.
AD-737 725

*WATERTOWN ARSENAL LABS MASS
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